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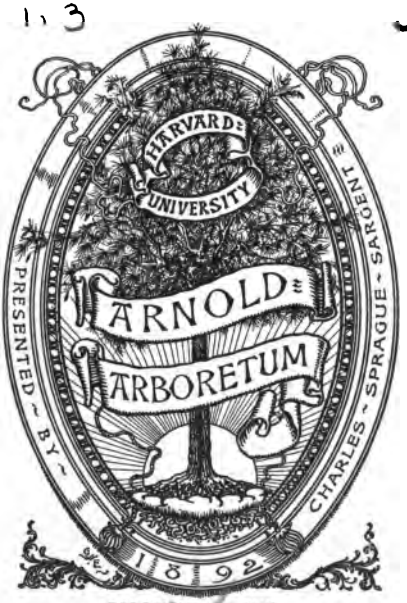

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CANADIAN FORESTS

FOREST TREES, TIMBER

AND

FOREST PRODUCTS

BY

H. B. SMALL.

MONTREAL
DAWSON BROTHERS, PUBLISHERS.
1884.

Entered according to Act of Parliament of Canada, in the year 1884, by
H. B. SMALL, in the Office of the Minister of Agriculture.

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THE CANADIAN PACIFIC RAILWAY CO'Y

Offer Farming and Grazing Lands for Sale in Manitoba and the Canadian North-West on the following terms.

Regulations for the Sale of Land.

THE completion of the Canadian Pacific Railway to the summit of the Rocky Mountains, 960 miles westward from Winnipeg, and the rapid progress made in the Government Surveys, during the past season, enable the Company to offer for sale some of the finest Agricultural lands in Manitoba and the North-West. The lands within the Railway belt, extending 24 miles from each side of the main line, will be disposed of at from

2 DOLS. 50 CENTS (10s. Sterling) PER ACRE.

upwards, WITH CONDITIONS REQUIRING CULTIVATION. Prices of lands without Conditions of Cultivation may be obtained from the Land Commissioner. When cultivation or settlement forms part of the consideration, a rebate for cultivation will be allowed as hereinafter described.

These Regulations are substituted for and cancel those hitherto in force.

TERMS OF PAYMENT.

If paid for in full at time of purchase, a Deed of Conveyance of the land will be given; but the purchaser may pay one-sixth in cash, and the balance in five annual instalments with interest at six per cent. per annum, payable in advance. Payments may be made in Land Grant Bonds, which will be accepted at 10 per cent. premium on their par value and accrued interest. These Bonds can be obtained on application at the Bank of Montreal, Montreal, or at any of its agencies in Canada or the United States.

REBATE.

A rebate of from 1.25 dols. to 3.50 dols. (5s. to 14s. Sterling) per acre, according to the price paid for the land, will be allowed on the acreage actually cropped on the following conditions:—

1. The purchaser will not be entitled to rebate unless at time of purchase he enters into an undertaking to cultivate the land.
2. One-half of the land contracted for to be brought under cultivation within four years from date of contract. In cases where purchasers do not reside continuously on the land, at least one-eighth of the whole quantity purchased shall be cultivated during each of the four years.
3. Where a purchaser fails to carry out fully the conditions as to cultivation within the time named, he will be required to pay the full purchase price on all the land contracted for. But if from causes beyond his control, proved to the satisfaction of the Company, a settler so fails, he may be allowed the rebate on the land actually cultivated during the four years, on payment of the balance due, including the full purchase price of the remainder of the land contracted for.

GENERAL CONDITIONS.

All sales are subject to the following general conditions:—

1. All improvements placed upon land purchased to be maintained thereon until final payment has been made.
2. All taxes and assessments lawfully imposed upon the land or improvements to be paid by the purchaser.
3. The Company reserves from sale, under these regulations, all mineral and coal lands, and lands containing timber in quantities, stone, slate, and marble quarries, lands with water power thereon and tracts for Town sites and Railway purposes.
4. Mineral, coal, and timber lands and quarries, and lands controlling water-power, will be disposed of on very moderate terms to persons giving satisfactory evidence of their intention and ability to utilise the same.
5. The Company reserves the right to take without remuneration (except for the value of buildings and improvements on the required portion of land) a strip or strips of land 200 feet wide, to be used for right of way, or other Railway purposes, wherever the line of the Canadian Pacific Railway, or any branch thereof, is or shall be located.

Liberal rates for settlers and their effects will be granted by the Company over its Railway. For further particulars apply to the Company's Land Commissioner, John H. McTavish, Winnipeg.

By order of the Board,
Montreal, December, 1882.

CHARLES DRINKWATER, Secretary.

The Lands of the Company are critically examined by competent surveyors, and no lands are accepted from the Dominion Government unless suitable for agricultural purposes; therefore the Canadian Pacific Railway Company have

NOT AN ACRE OF POOR LAND TO OFFER FOR SALE.

☞ Full information with regard to the country, its resources, and the best means of reaching it, may be obtained by addressing the Company's G. E. Agent in London, by whom correspondence is invited.

Alexander Begg, G. E. Agent, Canadian Pacific Railway Co., 88 Cannon St., London, E. C.

THE FORESTS OF CANADA.

If Canada has been highly distinguished in any respect by the bounty of nature, it is in the number and variety of its trees. An English traveller, writing on this subject, said: "I was never tired of the forest scenery of America, the endless diversity of its foliage always preventing it from being monotonous." A stranger gazing for the first time on the unbroken forest is peculiarly struck with admiration at the surprising and to him novel scenery it presents, a scenery peculiarly its own. A wide expanse of unknown extent, canopied above by the dark mass of spreading foliage; countless columns of trunks, which, far as the eye can reach, mile after mile, rise tall and erect, supporting that living roof, and long-drawn vistas through which the eye seeks in vain to penetrate the depths of the forest solitude; such is the scene which meets the eye. But it is when the first frost has touched the trees, and the change of colour in the leaves has set in, that the forests put on their greatest beauty. Each kind has its own hue—above all the maple—and every hue is lovely. The leaf of the maple, the first to colour, remains throughout the most beautiful in its golden yellow and crimson. Lofty trees and humble undergrowth, and climbing creepers, all alike deck the landscape with every tint that can be borrowed from the light, till the whole looks like the scenery of a fairy tale, and presents a spectacle unknown to the residents of the Old World. McGregor, in his work on British America, speaking of the forests, says: "Two or three frosty nights in the decline of autumn transform the boundless verdure of a whole empire into every possible tint of brilliant scarlet, rich violet, every shade of brown, vivid crimson, and glittering yellow. The stern, inexorable fir tribes alone maintain their eternal sombre green; all others, in mountains or in valleys, burst into the most glorious vegetable beauty, and exhibit the most splendid and most enchanting panorama on earth."

Dr. Hough, in his Forestry report to Congress in 1877, says: "The reciprocal influences that operate between woodlands and climate appear to indicate a close relation between them. It is observed that certain consequences follow the clearing off of forests, such as the diminution of rivers and the drying up of streams and springs; other effects scarcely less certain are seen in the occurrence of destructive floods and of unseasonable and prolonged droughts, with other vicissitudes of climate

which, it is alleged, did not occur when the country was covered with forests. These appear to have been brought about by their removal, and might in a great extent be alleviated by the restoration of woodlands to a degree consistent with agricultural interests." To such an extent has this forest destruction affected the rivers of the Northern States that a Commission was recently appointed to examine and report to the State Legislature of New York the real facts, and the conclusion arrived at was that this destruction of the forests, if continued in a wholesale manner, would affect not only "the climate and rainfall of the State, but its most important commercial interests in the welfare of its canals; and not only the latter interests would be assailed, but even more largely the railroads, river-towing, mills, ship and house building, carpentry generally, banking, and every other allied and connected business throughout the State." With the experience before us, gained from this investigation in a country bordering on our own, the lesson of precaution is taught, and the waste that has so indiscriminately prevailed hitherto in our forests should be stayed. New settlers, in their haste to get their land under cultivation, girdle and burn vast tracts of forest, while they could, with the greatest advantage to their crops and the general health and beauty of the country, leave every field with a fine belt of timber, surrounding it at least on three sides. So thoughtless are men in opening up new land that many have not even the forethought to select the knoll and save the forest where nature indicated should be the future home. That very spot is cleared of its trees, and when the time for building arrives a bare spot surrounds the house, on which a meagre shade is sought for by planting trees, which require the growth of years before any shade can be afforded.

The products of the forest have long been a source of great wealth to the several Provinces of the Dominion, and more especially to the older Provinces of Ontario, Quebec, Nova Scotia and New Brunswick, and the forests themselves offer us treasures such as few lands can rival and none can exceed. Public attention has of late years been more alive than formerly to their value, and to the necessity of economizing what yet remains of these rich national resources, and of replacing what has been so carelessly wasted—a necessity every day making itself more manifest. Wood as fuel is becoming scarce and dear near cities and towns, and our best timber is becoming more and more costly every year, whilst inferior timber now frequently takes the place and finds a ready sale where once only the best was in demand. It was natural enough that the first settlers in the forest should take summary measures to clear the soil for cultivation, but to keep up a wild waste both with axe and fire long after the soil is subdued will tend to hasten the time when our drafts upon the forest must be dishonoured. Wood must be had to use for various purposes, and the question of obtaining it enters largely and constantly into all branches of industry and living, whilst the wants of society, the general health of the people, the salubrity of our climate, and the increase of our national wealth are each and all closely connected with the growth or destruction of our forests.

INDUSTRIES DEPENDENT ON WOOD.

The annual consumption of wood by mechanical industry reaches an amount that will astonish anyone who has not given his attention to this subject, and as a verification of this, the last census of 1881 enumerates thirty-four industries or occupations which depend in whole or in part upon wood or timber as their raw material for manufacture or commerce, comprising a total number of 17,577 establishments, employing 95,741 hands, and turning out manufactured articles valued at $95,029,828. The following table of these industries and accompanying details will show at a glance the enormity of this branch of industry :—

Timber Industries.	Factories.	Hands.	Value of Products.
Agricultural implements	234	3,656	$ 4,405,397
Cabinet and furniture makers	1,169	6,957	5,471,742
Carpenters and joiners	2,494	5,702	3,893,910
Carriage-makers	3,143	8,703	6,579,082
Cooperages	1,430	3,277	1,808,929
Saw mills	5,390	42,085	38,569,652
Shingle factories	801	2,389	766,998
Tanneries	1,012	5,491	15,144,535
Boat building	216	421	173,837
Broom and brush factories	91	957	762,584
Pot and pearl asheries	225	467	345,096
Pump factories	237	470	377,975
Sash, door and blind factories	356	2,878	4,872,362
Shipyards	227	4,454	3,557,258
Basket making	68	227	55,651
Charcoal burning	32	83	70,030
Spinning wheel factories	22	41	24,912
Wood turning establishments	80	604	431,797
Carving and gilding establishments	82	500	516,675
Match factories	22	1,062	511,250
Trunk and box factories	49	626	677,877
Bark extract factories	4	140	286,250
Billiard table factories	3	20	44,827
Car and locomotive works	17	3,154	3,956,361
Fishing tackle factories	2	6	7,050
Last factories	11	118	77,900
Pail and tub factories	20	150	120,935
Picture frame factories	1	2	5,000
Planing mills	66	633	992,201
Shook factories	35	80	228,785
Stave factories	31	265	168,520
Tree nail factories	1	2	1,400
Window shade factories	11	53	59,450
Pulp Mills	5	68	63,300
	17,577	95,741	$95,029,828

In addition to the foregoing there are numerous other branches of trade that could not be carried on without the aid of wood, which, although it does not form part of their productions, is yet essential to their manufacture or development: such, for instance, as lime burners, brick makers, &c. Railroads are enormous consumers of wood. In building a new road the estimate is that 2,700 ties are required for the mile, and 300 ties are annually wanted to keep the mile in repair. When it is borne in mind that these ties are, for the most part, taken from sound hemlock, oak, larch or cedar trees, selected of a size just sufficient to furnish one or two ties only (the tree being simply hewn on two sides, and leaving the heart entire), the destruction of choice timber approaching a size suitable for sawing is immense. The timber also

used by railroads in erecting bridges and trestlework and in fencing is a great item, and the consumption of wood for fuel by locomotives has attained such proportions that other kinds of fuel are being resorted to by many of the roads, owing to the high price and difficulty of obtaining wood, even where the roads traverse a partially wooded district. As an instance of the amount of wood so consumed, an official report shows that on the New York Central Railroad there is required for each twenty-five miles passed over by each locomotive one and three-quarters cords of wood, and this even is supposed to be one-third less than the amount actually burned by them.

The value of timber as an article of commerce may be ascertained from the fact that the production in 1881, as given by the census, equals 111,633,862 cubic feet of partially manufactured timber alone, the consequent operations on which involve an enormous outlay. The term partial manufacture is used because it only really embraces the operations necessary to prepare the timber from the tree, which is not, strictly speaking, manufactured at all. It is simply analogous to pig iron or crude petroleum, or other mineral productions separated from their earthy particles previous to transportation. Thus timber squared, sawn and planed cannot be said to be manufactured, because it is not actually made into the particular shape in which it could enter domestic service, except in very rough or ordinary cases, but only sufficient of the useless material has been removed to render it available for the hands of skilled workmen, or to prevent useless expenditure in freight. In addition to the cubic feet of timber alluded to, the census enumerates 22,324,407 pine logs, 26,025,584 other logs, 192,241 masts and spars, 41,881 thousands of staves, 98,311 cords of laths, 400,415 cords of tan bark and 10,993,234 cords of firewood as the product of the year, whilst the value of the pearl and potash produced was $345,096, and of bark extract for tanning purposes $286,250.

EXPORTS OF THE FOREST.

The export of square timber, deals, staves, masts, birch and other hardwood timber for furniture purposes to Great Britain, and of sawn lumber and boards to the United States, to the West Indies and to South America forms one of the most important sections of the industrial pursuits of this country. The total export of forest products of Canada is shown as follows, the figures being taken from the Trade and Navigation Returns for the last three years:—

	1881.	1882.	1883.
Forest products	$24,960,012	$23,991,055	$25,370,726
Manufactures of wood	1,030,121	1,216,311	1,391,166
Making a total of	$25,990,133	$25,207,366	$26,761,892

A full table, giving the details of the above, and specifying the Provinces from which the exports were made, is here appended:—

	1881.	1882.	1883.
ONTARIO:			
Rough products	$ 6,576,332	$ 8,015,485	$ 7,825,691
Agricultural implements	30,448	43,284	15,863
Carriages	35,310	19,210	14,090
Hemlock bark extract	325	.....	.....
Ships	11,300	.....	.....
Furniture	92,513	93,708	126,820
Doors, sashes and blinds	14,307	37,930	12,462
Woodenware	82,508	123,204	55,514
QUEBEC:			
Rough products	12,785,223	9,280,238	11,050,002
Agricultural implements	821	2,708	648
Carriages	6,597	10,143	5,654
Hemlock bark extract	131,986	94,496	71,581
Ships	162,600	129,433	58, 33
Furniture	5,631	5,647	3,424
Doors, sashes and blinds	7,965	2,067	9,540
Woodenware	160,727	180,025	255,501
NOVA SCOTIA:			
Rough products	1,325,280	1,587,941	1,650,811
Agricultural implements	.....	.....	30
Carriages	3,430	1,907	1,680
Hemlock bark extract	8,957	10,600	49,900
Ships	65,586	63,171	109,129
Furniture	1,334	6,572	1,899
Doors, sashes and blinds	8	.....	.....
Woodenware	27,848	23,191	23,630
NEW BRUNSWICK:			
Rough products	4,068,241	4,724,422	4,408,203
Carriages	450	695	250
Hemlock bark extract	48,800	129,812	183,937
Ships	44,857	101,840	186,076
Furniture	185	400	164
Woodenware	20,089	27,053	19,520
BRITISH COLUMBIA:			
Rough products	162,747	362,871	407,634
PRINCE EDWARD ISLAND:			
Rough products	42,189	20,098	23,385
Agricultural implements	.....	150	225
Carriages	540	101	40
Ships	63,675	107,867	153,100
Furniture	724	227	50
Woodenware	485	570	626
MANITOBA:			
Carriages	115	300	1,575
Furniture	.....	.....	.....
Woodenware	.....	.....	5
Total	$25,990,133	$25,207.366	$26,761,872

In addition to the exports, the quantity of timber used in the Dominion is about two-fifths of the whole. The amount of capital invested in timber lands and saw mill property is at least $35,000,000, the value of the output is $38,000,000, and the amount annually invested in working capital is $20,000,000. Fifty per cent. of the whole products of the forest represents labour, and thirty-five per cent. for stumpage, ground rents, interest on mill property, cost of limits and working capital. There are employed in producing this timber in the woods during the winter about 13,000 men, during the summer in the mills about 15,000, and over 5,000 are employed in loading and manning the craft that convey it to market. These 83,000 men, the greater proportion of whom have families, represent a large population. Looking at the indirect benefits derived from this industry, such as the construction and repair of mills, machinery, barges and steamboats, and the benefit derived from the number of ships which take away our timber and timber products, it is hard to overestimate its importance. Quebec for the past ten years has loaded on an average 620 vessels, representing 800 tons each, and carrying about four hundred million feet of lumber and timber, whilst as much more was shipped in other ports of the Dominion on seagoing craft. Montreal exported in 1882, by steamships principally, eighty-eight million feet of three inch deals to Europe, and twenty-two million feet of boards and planks to South America. The lumbermen, moreover, create a home demand for farm products, generally at better prices than could be obtained elsewhere. To give an idea of the large consumption of agricultural produce in this business, the following statement of the requirements of one large firm in the Ottawa district for one season answers for all others in its general outline. This firm consumes 750 tons of hay, 25,000 bushels of oats, 5,000 bushels of turnips, 6,000 bushels of potatoes, 1,000 barrels of pork, 9,000 barrels of flour, 2,000 barrels of oatmeal in the woods alone, or in round figures 2,400 tons of agricultural produce are required by this one firm.

Sawn lumber is, to a great extent, taking the place of square timber for exportation, a step in the right direction, as it saves much waste in the wood, as well as costly freight in nearly worthless wood contained in the centre of nearly every piece of square timber, as well as keeping a large amount of labour in the country, such as sawing, piling, &c. Square timber must be selected with the greatest care, nearly perfectly straight, and entirely free from knots, shakes or any other blemish. It must be hewn perfectly square, and must carry the same thickness throughout, a very slight taper only being allowable; it must be thirty feet in length, and should square at least fifteen inches. The loss in its manufacture is very great, especially when of large growth and squaring eighteen inches or over. Splendid pieces of timber have been not unfrequently left on the ground because they were not square evenly throughout. With the exhaustion of our larger timber attention will have to be paid to trees of a smaller growth, which have hitherto been passed over by the lumberman as beneath his notice. In the forests of Europe trees of this size

are utilized on the spot, being manufactured into tongued and grooved lumber by portable steam machinery taken into the woods, a plan which sooner or later will have to be resorted to here.

The lumber trade and its products may be said to be associated with the wants of man from his cradle to his grave. The stately three-master that sails the ocean and the tiny match that lights the lamp equally owe their existence to this industry, and from the very sawdust, which has so long been looked upon as an incumbrance, are now produced artificial boards.

TIMBER DISTRICTS OF THE DOMINION.

The most important and extensive timber districts or limits of the Dominion can be briefly stated, leaving a more detailed description of them to be given under their respective provinces. Beginning from the Pacific shores, the forests of British Columbia, possessing some of the finest timber in the world, have yet scarcely been attacked by the lumbermen to any extent, and the trees assume a size exceeding other districts, supposedly from the mildness and humidity of the climate. The forest is not confined to any one part of the province, but extends through nearly the whole of it. Progressing eastwards from the Rocky Mountains to the Province of Ontario there are scattered here and there tracts of well timbered land, but not of an extent to class them with other timber lands where the material is got out for export. In the older provinces the timber lands lie in the territory north of Lakes Superior and Huron, the Georgian Bay country, Nipissing and Muskoka region, in the district drained by the Ottawa, St. Maurice and Saguenay rivers with their tributaries, the Eastern Townships of Quebec and south shore of the St. Lawrence to the Gulf, including Gaspe, the region on the north shore of the St. Lawrence from the Saguenay to the Bersimis, and still lower down to Mingan, and the country watered by the St. John, the Miramichi, the Restigouche and their tributaries. These limits in many places are scattered and isolated, and have, with few exceptions, been worked for a long time for pine of first quality, but still contain an immense supply of spruce, principally in the east. But the lumbermen are yearly advancing in the forest; all the accessible tributaries of the Ottawa, the Madawaska, the Bonnechère, the Mississippi, the Petewawa and others have been worked for years on the Ontario side, whilst on the Quebec side they have nearly reached the head waters of all its tributaries, the Rouge, the du Liévre, the Gatineau, the Jean de Terre, Lake Kakebonga and Lac des Rapides, and they are extending their operations along Lake Temiscamingue and the Keepawa. On the St. Maurice River they are as far up as Lake Manooran, on the west, and on its eastern side the Bostonais and Riviére Croche have been despoiled of their finest pine, which is now sought for only at the head waters of these rivers. In the Saguenay region there is only a limited supply of pine left south of Lake St. John, but plenty of spruce remains untouched

there. North of Lake St. John there is some good pine, and so on the River Shipsha, Lower Saguenay, Ste. Marguerite, and Petit Ste. Jean. As for the large rivers that flow into Lake St. John the large pine has nearly all disappeared on the lower part, and the remainder of the course of these rivers is through an immense burnt wilderness, where even the vegetable soil has been destroyed by fire. The large district between the St. Maurice and the Ottawa is thinned through and through, and the lumberman of the Ottawa has met his fellow-workman of the St. Maurice on the shores of Lake Manooran. Northward from Lake Temiscamingue and the Montreal river there is not much country before the height of land is reached, the watershed dividing the streams that flow into the St. Lawrence from those that flow into Hudson Bay. Fine pine grows there along the head waters of the Ottawa. Over this height of land the streams all run north, and the rivers flowing into Hudson Bay, the Rupert, the Notway, and the Hurricanaw will doubtless with the opening of navigation through Hudson Straits encourage our lumbermen to turn their efforts in that direction, and a supply of timber may be got at there not only for export, but also largely for home consumption in the treeless districts of the great North-West. There remains in all the above districts a great deal of spruce and second rate pine, which for generations to come will meet our local wants with care; but the first quality pine, requisite to keep up our great timber export trade to its standard, is getting, with the exception of British Columbia, scarce and inaccessible.

Respecting the supply of pine lumber remaining some startling facts were mentioned at the Forestry Convention in Montreal, in 1882, by Mr. Little and other well known authorities on this subject. Mr. Little stated that in Canada (this apparently was not inclusive of British Columbia) we have but ten thousand million feet of first quality pine (Quebec 5,000, Ontario 3,500, and the Maritime Provinces 1,500) remaining, while we are at present cutting one thousand million feet annually. At this calculation it is only a question of time when the supply will cease.

TIMBER DISTRICTS OF THE PROVINCES AND THEIR TREES.

PROVINCE OF ONTARIO.

EXPORTS.	1881.	1882.	1883.
Rough products of the forest	$6,576,332	$8,015,485	$7,825,691
Manufactured products of the forest	266,711	317,336	254,749

It is a difficult matter to state with any accuracy the timber districts of Ontario, as no inventory of the total amount of that "stock" has been taken for many years. Mr. Phipps in his report to the Ontario Government on the necessity of preserving and replanting forests, says, the north-west territory of Ontario, or that part known as the disputed boun-

dary district, contains a large quantity of very valuable timber, comprising one of the chief timber reserves in all the north-west, so far as present information is obtainable. This timber is in a position where it will always command ready sale, and comparatively untouched by the lumbermen or settler, offers as yet a most excellent opportunity not only for procuring timber, but also for maintaining the supply. In Muskoka, Parry Sound, Algoma, and the Georgian Bay district there are forests of some size, and on the north-east of the Province a large extent of forest exists. The great water-shed which crosses the eastern part of Ontario stretches from north-west to north-east, from near Nipissing till it strikes the St. Lawrence near Kingston. This height of land separates the waters running into the lakes, and those running into the Ottawa River. It is emphatically a land of moisture and of streams. It abounds with numerous and beautiful lakes, rivers and water powers that would delight the eyes of a manufacturer. The great slope leading to this watershed from the Ottawa River, bordering the north-east of the settled portion of Ontario, is, so far as fire has yet spared them, clothed with woods. Partly the lumberman has here and there taken out timber, partly they are untouched by his axe. But the settler is gradually encroaching on this district, and all along the northern border its edge is annually being fretted, and pierced with roads. Isolated farms are being cleared in its solitude, and the forest is yearly becoming drier and more dry, and its outer edge presents a most inviting aspect for fires to run through it in a dry summer. This, the principal forest reserve, as the one which feeds the sources of most of the streams east of Toronto, is likely, under present conditions, to disappear much more rapidly than did the more heavy and deciduous woods in the older settled districts. The main reason why this mass of forest has not been ere this more deeply penetrated by the settler is that the land is not nearly so good for agricultural purposes as that in the older settled districts of the Province. It is a granite formation and lacks lime, and will never equal in an agricultural capacity that based on a limestone formation. Referring to this, to the Muskoka and to the Parry Sound regions, which in many respects are similar, Mr. Phipps says, it is a matter of great importance to preserve the pine forests in these vicinities, and that, for these reasons—

1. They are the true pine reserves of the older districts of Ontario.

2. The land whereon they stand can never yield, for purposes of agriculture, anything like the return it is capable of producing if maintained in continual pine-bearing forest.

3. If proper care be taken these great districts can, by the adoption of European methods, be placed in a state of continual reproduction, which will allow, every year, a very large amount of valuable pine to be cut without clearing the land or in any way injuring the forest capacity for production.

4. It would be far better to commence the preservation of forest areas along the present existing line of clearing than to commence similar

operations much farther back. If, as is stated, the land is much better farther to the north, it would be better to renew the clearing there, so as to leave a broad belt of forest to the south of the new settlements; for a forest district to the south (without prejudice to the height of lands considerations) will attract summer showers to the cleared land north of it, while from a north forest comes little rain at the season when most needed.

He then goes on further to remark in this connection, "This region of country possesses many and valuable water-courses, which would dry up were the country cleared, but which the retention of the forests will retain in full value. I would also state, that the quality of the water flowing over the granite bed, it being free from lime, is remarkably well adapted to various textile manufactures, and would suggest that large manufacturing villages and towns might find occasion for profitable existence in the heart of the large forests which, I conceive, Government should retain in this part of the country. Such towns and villages will by no means lack communication with other parts of the country, as the Canada Pacific, and its connecting railways, will pass through the present wilderness near the vicinity where it is desirable these forests should be maintained. I would here suggest that large portions of forest might be preserved, let us say, after the merchantable lumber has been carried off by the lumberman, by alloting them in free grants to persons who would undertake to maintain the land in its wooded condition."

The whole great peninsula to the west is destitute of most of the original forests on the elevated lands which gave her rivers water, and has little in the way of woods save the small reserves farmers have kept for themselves. These are being rapidly used; they fade away and are not replaced. The list at the end of this section will show exactly the acreage under wood still left in each county, out of what a century ago was all forest, and judging therefrom, if the present system goes on without remedial measures being applied, the great peninsula of Ontario will, in a few years, become a disforested land.

Mr. Phipps says, "If we pass through much of the forest which Ontario still retains in governmental hands, we shall find, here and there, many a large expanse desolated by fire and growing up again, a brushwood choking itself to uselessness, covering a burnt and impoverished soil. We shall find great areas of forest the lumbermen have culled of pine and spruce, of ash and oak. Every here and there are the relics of their operations—the close hewn stump, and, a goodly distance therefrom, the great pile of decaying branches where the head of the tree had fallen; while the whole distance between, if round timber had been got out, shows nothing but a few scattered side limbs, but if square it is paved with immense pine fragments—short thick slabs whose deep clean cut show the force of the score-hacker's arm, and long lengths of those peculiar chips, slightly connected, thin and broad, smooth on one side, the depth and straightness of which show how deftly the handler of the broad-axe has plied his unwieldy tool; and if you come near the stump,

and it has been heavy timber squared for the English market, you will find in great masses, hewn off, thrown away and rotting, as much clear timber as, sold at Toronto prices, would go far towards the whole sum the lumberman will ever get for the log. The piles of *debris* are everywhere, and form a most inflammable portion of the touchwood of a forest. Then before the strong oxen could drag the great log to the river down which it had to be floated an avenue of smaller trees had sometimes to be cleared from the way, and these likewise piled in desicating heaps, their skeleton branches protruding among the green undergrowth, like the ghastly relics of mortality on a forgotten battlefield, cumber the forest floor."

You will find many places where trees are choking one another for want of air and light, until in lapse of years some stronger one shall tower above his fellows. You will find places where hurricanes have cut their way through the forest, and the trees lie for miles, as the ranks mown down by the mitrailleuse. You will pass the solitary bush road, the trees which once grew therein chopped right and left into the forest by the makers of the track, where they lie in dry heaps for miles on miles forming as pretty a fire-track as one could wish to see. And everywhere you will find millions of young trees giving full promise, if spared axe and fire, of becoming trees as sturdy as any the lumberman has carried away, but nevertheless, the impression produced on you by the whole pilgrimage will be that, if no preventive measures be used, the fire which has taken so much already will sooner or later take the rest. When one compares the state of our forests with that of those in some parts of Europe, and thinks of the long avenues of fire-breaks, the forest-rangers on the watch, the careful management, the incessant thinning and replanting, the long succession of goodly trees yearly ready for the axe, and the certainty, with equal care, of such a succession for all time to come, one is apt to think it full time that some such system were introduced here.—(*Phipps' Report*).

Forest Existing in Ontario Counties.

(*From Agricultural Commission.*)

Prescott and Russell.—About forty-seven and a half per cent. of the entire area is under timber, consisting of hemlock, cedar, tamarac, beech, birch, elm, basswood, ash, balsam, pine, spruce, walnut, butternut, whitewood, dogwood, soft maple, and red and black cherry; used principally for lumber, fencing, firewood, railway ties and saw logs.

Glengarry, Stormont, and Dundas.—Probably about thirty per cent. of the entire area of these countries is still timbered with hard and soft maple, beech, birch, ash, tamarac, elm, basswood, hemlock, spruce, balsam, and some pine; used for fuel, lumber, railway ties, telegraph posts and shingles.

Carleton.—About 287,000 acres of land in this county are still uncleared.

Leeds and Grenville.—In all the townships, except South Burgess and North Crosby, which have suffered from the ravages of bush fires, there is a large amount of standing timber, consisting mainly of hard and soft woods; used for firewood, fencing, lumber, buckets and pails.

Lanark.—About twenty-four per cent. of the uncleared land is covered with timber or bush. The timber is chiefly pine, beech, maple, basswood, ash, birch, cedar and tamarac. A considerable export trade in hardwood is carried on, and there is a large local consumption for railway ties, fencing, fuel, etc. A great destruction of pine took place from the great fire in 1870.

Renfrew.—About forty-six per cent. of the entire area is still timbered. Red and white pine exist in large quantities. There is also an abundant supply of ash, elm, maple, basswood, spruce, cedar, tamarac, balsam, poplar, beech and hemlock. Lumbering is extensively carried on for exportation to European and American markets. The hard woods are chiefly used for fuel and cedar for fencing.

Frontenac.—As nearly as can be computed, about fifty per cent. of the land in Frontenac is still timbered with pine, basswood, ash, hemlock, beech, balsam, tamarac, cedar and maple; principally used for lumber, fencing and fuel.

Lennox and Addington.—Owing to the returns being in several instances obviously inaccurate, the extent of land in the counties under timber cannot be estimated. Four-fifths of Denbigh and associated townships are, however, reported to be under pine, maple, beech and cedar, and lumbering is extensively carried on. There is also a considerable quantity of timber land in North and South Fredericksburg, in Camden and in Sheffield.

Prince Edward County.—About sixteen per cent. of the entire area is still covered with timber, consisting of beech, maple, elm, cedar, oak, black ash and some pine; used for lumber, fuel, coopers' staves, fencing and building.

Hastings.—A large proportion of the acreage is still covered with timber—in some townships to the extent of seventy-five per cent.

Haliburton.—About eighty per cent. of the entire area is still under timber, consisting principally of maple, beech, birch, hemlock, basswood, elm, ash, pine, tamarac and cedar; used for lumber, fencing, railway ties, telegraph poles, shingles, bolts, saw-logs, etc.

Peterborough.—A large proportion—not far short of one-half of the area—is under timber, consisting of pine, cedar, beech, maple, hemlock, basswood, tamarac, birch and ash; used for timber, fencing, firewood, shingles, bolts, railway ties and telegraph poles. Bush fires have destroyed large tracts, particularly in the township of Harvey.

Northumberland and Durham.—About eighteen per cent. of the total acreage is still timbered with hardwood, cedar, pine, hemlock and tam-

arac. The former is used principally for fuel, the latter for building, fencing, and barrel staves.

Victoria.—Probably about fifty per cent. of the uncleared land is under timber, consisting of cedar, pine, hemlock, maple, birch, beech, basswood. black ash, mountain ash, balsam, tamarac, oak and elm; used for lumber, fuel, building and fencing.

Ontario.—About seventeen per cent of the area of Ontario is still under timber (excepting the township of Reach, which returns no percentage). The timber consists of pine, maple, beech, basswood, tamarac, balsam, cedar, black ash, hemlock and elm; used mainly for lumber, fuel, fences, staves and domestic uses.

York.—About twenty-two and a half per cent. of the area of York is still under timber, consisting of beech, maple, elm, basswood, pine, hemlock, cedar, tamarac and birch; used for building purposes, fencing and firewood.

Simcoe.—It is impossible to glean from the returns the total acreage under timber, but probably over one-half of the entire county area is under maple, beech, elm, basswood, tamarac, pine, hemlock, cedar, balsam, birch, ash and oak. Lumbering operations are very extensively carried on in several of the townships, and there is a large amount of business done in hemlock bark (which is largely used within the county, and also exported for tanning purposes), and in railway ties, telegraph poles and shingles. The hardwoods are principally used for fuel, and the soft woods for building aud fencing.

Peel.—About eleven per cent. of the entire acreage is still under timber, consisting of beech, maple, hemlock, cedar, white and red oak, ash, elm, hickory and basswood. A few pine are scattered in Chinguacousy and Toronto townships. The timber is generally used for fuel, fencing and domestic purposes.

Halton.—About seventeen per cent. of the entire area is still timbered, chiefly with hardwood and a limited amount of pine. The timber is principally used for lumber, fencing and fuel.

Wentworth.—Fourteen and a half per cent. probably under timber, consisting of pine, beech, maple, elm, black ash, cedar, tamarac, oak, hickory, walnut and chestnut; used for lumber, firewood, fencing, building and general purposes.

Lincoln.—Exclusive of the township of Caistor, which does not report the area of land still timbered, Lincoln has over 24,000 acres still covered with beech, black ash, maple, elm, oak, hickory and some pine; used for firewood, fencing, building and manufacturing purposes, also for ship timber and railroad ties.

Welland.—About eighteen per cent. of the area is still under timber, consisting of beech, maple, oak, ash, basswood, elm, hemlock, poplar, birch, chestnut, walnut and butternut; used for shipbuilding, house-building, fencing and fuel.

Haldimand.—About twenty-four per cent. of the acreage is still timbered, consisting chiefly of hardwoods; used for fencing, fuel and building purposes.

Norfolk.—About twenty-four per cent. of the entire area is still timbered, and the standing timber consists chiefly of pine, oak, maple, chestnut, black and white ash, elm and cedar; used for railway ties, lumber, fencing, firewood and general purposes.

Brant.—About twenty-five per cent. is yet in timber of maple, beech, elm, oak, pine, cedar, basswood, tamarac, hickory and ironwood.

Waterloo.—About twenty-two and a half per cent. of the area is still timbered with pine, oak, beech, maple, cedar, ash and hemlock.

Grey.—About thirty-four per cent. of the land is still timbered, chiefly with hardwood. Very little pine exists, and only sufficient cedar for fencing purposes.

Bruce.—About twenty-five per cent. of the land is timbered. Maple, basswood, elm, hemlock, cedar, ash, beech and birch predominate; there is also some pine.

Huron.—About twenty-nine per cent. is covered with timber; hard and soft woods.

Perth.—About twenty-one per cent. is covered with timber, consisting of beech, elm, maple, basswood, black and white ash, pine, hemlock, cedar, birch and tamarac.

Oxford.—Seventeen per cent. under pine, cedar, beech, maple, elm, ash, basswood and oak.

Elgin.—Thirty per cent. is timbered with most of the indigenous woods excepting cedar.

Middlesex.—Thirty-five per cent. under hardwood and some pine.

Lambton.—Forty-eight per cent covered with oak, ash, elm, beech, maple, basswood, hickory and some pine.

Kent.—Thirty-seven per cent. in oak, black and red ash, hickory, hard and soft maple, cherry and sycamore, some black walnut and some tulip.

Essex.—Two-thirds still under bush, consisting chiefly of whitewood, oak, ash, elm, hickory, bass, sycamore and other woods.

Wellington.—About fifteen per cent. is still timbered with beech, maple, elm, cedar, hemlock, basswood, ash and balsam.

According to Mr. Ward, Ontario furnishes 4,474,000 pieces, equal to 2,600,000 standard pine logs of 200 feet each, producing 520,000,000 feet of lumber; 6,790,090 cubic feet of white and red pine, or 81,000,000 feet b. m.; dimension timber, 23,000,000 feet b. m.; hardwood, cedar, &c., equal to 5,000,000 feet—making in the aggregate 635,500,000 feet b. m.; paying to the Provincial Government for timber dues $501,000, and ground rents $46,000, with eighteen thousand square miles under license.

PROVINCE OF QUEBEC.

Exports.	1881.	1882.	1883.
Rough products of the forest.....	$12,785,223	$9,280,238	$11,050,002
Manufactured products of the forest.....	476,327	424,519	404,581

The timber districts of Quebec are that portion of it lying east of the Ottawa River; the district of the St. Maurice, a river which, with its tributaries, drains an area of 22,000 miles, rich in pine, spruce, birch, maple and elm; the Saguenay country, with an area of 21,000 square miles, affording pine, spruce, birch and tamarac; and the Gaspé peninsula. Important operations are also carried on upon the rivers north of the St. Lawrence. The great forest of Canada, *par excellence*, says the Hon. Mr. Joly, is spread over the vast territory watered by the Ottawa, the St. Maurice, the Saguenay and their tributaries, over one hundred thousand square miles in extent, and the tables of exports of the rough products of the forest from Quebec show, to a great extent, the amount of its production. The Province of Quebec in particular, is highly favoured by its numerous streams and lakes, many of which are turned to good account by the lumhermen, who build dams at the outlets of the latter, thus creating great reservoirs of water, which are held in reserve to be used when the streams get low, thus enabling them to get down their logs and timber the first year after they are cut, whilst without these artificial means they might not reach their destination for two or three years. By the adoption of these dams, what are known as rear limits have become almost as valuable as those fronting a main river. The same wholesale destruction of the forests in Quebec has prevailed for many years as in Ontario, and on this point the Hon. Mr. Joly, in his valuable article on Forestry, says :

I do not fear so much on the score of deficient supply for our home necessities, but it is our great export trade that is in jeopardy. We have still got an enormous quantity of common timber on the Crown Lands, and our people, beginning to appreciate the value of the wood that grows on their own farms, have generally ceased to look upon it as an incumbrance to be got rid of at any cost. But it was not always so, nor is it so everywhere even now. As far back as the year 1696 the attention of the French Governors of Canada was drawn to the wasteful destruction of the forests, and they were called upon to check it. Nothing, however, was done by them, and little has been done since. The result stares us reproachfully in the face, especially in the Province of Quebec, the oldest in the Dominion. The old settlements are painfully bare of trees; you can sometimes go miles without seeing any tree worth looking at, and the passing stranger fancies himself in a country more denuded of trees than the oldest parts of Europe. There is a large district of very good agricultural land, south of Montreal, where the scarcity of firewood, which is a matter of life and death in our climate, has compelled many a farmer to sacrifice a fine farm and leave the country; there are many

other spots in the Province nearly as bad, and unfortunately the process of destruction is going on even now in more places than one.

According to Mr. Ward, Quebec has under license 48,500 square miles, producing 2,500,000 pine logs, equal to 386,000,000 feet b.m., and 1,308,000 spruce logs, producing 106,000,000 feet b.m.; white and red pine timber 3,110,000 cubic feet, equal to 37,320,000 feet b.m.; hardwood, 51,000 cubic feet, or 611,000 feet b.m.; railroad ties, 143,000 pieces, 32 feet each, making 4,576,000 feet b.m.; cedar equal to 4,500,000 feet; pine and spruce round timber, 5,760,000 feet b.m.; tamarac, 175,000 feet b.m.; hemlock, 34,000 feet; cordwood, equal to 5,000,000 feet, making in all 549,976,000 feet, giving a gross revenue of $668,596 to the Province.

I am indebted to Mr. Chapais for the following list of trees as belonging to this Province, whose woods are used in manufacture: BIRCH, white, canoe, yellow, black and red; HICKORY, bitter, shell-bark and whiteheart, HORNBEAM; OAK, white, chestnut and red; COFFEE TREE; SPRUCE, white, Norway, and black; MAPLE, white or silver, rock or sugar, striped and red; ASH, black, white and red; BEECH; LARCH; BUTTERNUT; ELM, white, and red or slippery; IRONWOOD; POPLAR, large toothed, balsam, cottonwood and aspen; PINE, white, scrub, red or Norway; PLANE TREE; HEMLOCK; FIR, balsam; WILLOW, white and yellow; MOUNTAIN ASH; WHITE CEDAR; BASSWOOD.

For the sake of affording a means of identification of the above trees when the ordinary appellation of the Provinces is made use of, a list is appended enumerating the English, French and botanical names:

Ash, Black	Frene, Noir	*Fraxinus Sambucifolia.*
Ash, Red	Frene, Rouge	*Fraxinus Pubescens.*
Ash, White	Frene, Blanc	*Fraxinus Americana.*
Basswood	Bois, Blanc	*Tilia Americana.*
Beech	Hetre	*Fagus Ferruginea.*
Birch, Black	Merisier, Rouge	*Betula Occidentalis.*
Birch, Canoe	Bouleau à Canot	*Betula Papyracea.*
Birch, Red	Bouleau, Noir	*Betula Lenta.*
Birch, White	Bouleau, Rouge	*Betula Alba.*
Birch, Yellow	Bouleau, Blanc	*Betula Lutea.*
Butternut	Noyer, Tendre	*Juglans Cinerea.*
Cedar, White	Cedre, Blanc	*Thuya Occidentalis.*
Cherry, Black	Prune	*Prunus Serotina.*
Coffee Tree	Bonduc, Chicot	*Gymnocladus Canadensis.*
Elm, Red or Slippery	Orme, Rouge	*Ulmus Fulva.*
Elm, White	Orme, Blanc	*Ulmus Americana.*
Fir	Sapin, Blanc	*Abies Balsamea.*
Hemlock	Pruche	*Tsuga Canadensis.*
Hickory, Swamp or Bitter	Noyer, Dur	*Carya Amara.*
Hickory, Shell-bark	Noyer, Tendre	*Carya Alba.*
Hickory, Whiteheart	Noix, Blanche	*Carya Tomentosa.*
Hickory, Pignut	Noyer, Brun	*Carya Foreina.*
Hornbeam	Charme	*Carpinus Caroliniana.*
Ironwood	Bois, Dur; Bois, Fer	*Ostrya Virginica.*
Larch (Tamarac)	Epinette, Rouge	*Larix Americana.*
Maple, Red	Plaine	*Acer Drummondii.*
Maple, Rock or Sugar	Erable à Sucre	*Acer Saccharinum.*
Maple, Striped	Bois, Barre	*Acer Striatum.*
Maple, White	Erable, Blanche	*Acer Dasycarpum.*

Mountain Ash	Cormier	*Pirus Americana.*
Oak, Chestnut	Chene, Jaune	*Quercus Prinus.*
Oak, Red	Chene, Rouge	*Quercus Rubra.*
Oak, White	Chene, Blanc	*Quercus Alba.*
Pine, Red or Norway	Pin, Resineux	*Pinus Resinosa.*
Pine, Scrub	Pin, Gris	*Pinus Banksiana.*
Pine, White	Pin, Jaune	*Pinus Strobus.*
Planetree	Platane de Virginie	*Platanus Occidentalis.*
Poplar, Aspen	Tremble	*Populus Tremuloides.*
Poplar, Balsam	Baumier	*Populus Balsamifera.*
Poplar, Cottonwood	Liard	*Populus Monilifera.*
Poplar, Large-toothed	Peuplier	*Populus Grandidentata.*
Spruce, Black	Epinette Jaune	*Picea Nigra.*
Spruce, White	Petite Epinette	*Picea Alba.*
Willow, White	Saule	*Salix Cordata.*
Willow, Yellow	Saule Jaune	*Salix Nigra.*

There are several other trees, but, not being indigenous, they are not given above, such as the Lombardy Poplar (Peuplier de Lombardie), *Populus Pyramidalis*, the Locust Tree (Acacia), *Robinia Pseudo Acacia*, and some few others. The Lombardy Poplar appears to have been one of the trees always planted where one of the early mission stations was established, and is to be found especially around churches and old seignorial mansions.

PROVINCE OF NOVA SCOTIA.

Exports.	1881.	1882.	1873.
Rough products of the forest	$1,325,280	$1,587,941	$1,650,811
Manufactured products of the forest	107,163	105,441	186,268

(*Report of W. A. Hendry, Deputy-Commissioner of Crown Lands.*)

So well adapted is this province to the growth of timber, that with a judicious system of felling trees, viz., not to cut them under a certain size, the forest if preserved from fires would continue for many generations to supply the present demand. Every portion of the unoccupied portions of the province would now be covered with a heavy growth of wood were it not for the destruction to the soil and forest by fires in the woods which scourge the country every season. Forests create and gradually improve a soil; the axe, it is true, makes sad havoc with the trees, but fires are terrible.

The trees of Nova Scotia may be described as follows—

Larch or Juniper—Aboriginal name—Hackmatack.—This is the strongest and most durable of all the pine kind which we have. For ship-building purposes it is even superior to oak itself; in old vessels the timbers made of hackmatack have been found entirely sound when those of white oak were completely decayed. This wood is universally used in every part of the province for treenails and knees, and, indeed, is extensively exported in that shape to the United States. It grows naturally

upon poor gravelly soil, in cold mossy swamps, and very barren places all over the province. It is very easily raised from seed or seedlings, grows rapidly, but rarely exceeds eighteen inches diameter.

Hackmatack, on account of its very valuable qualities, deserves to be extensively cultivated; there are thousands of acres in every county in the province of worthless barren and swampy land that might be covered with these trees or with the European larch, which is nearly the same in respect to excellence of its qualities but superior in rapidity of growth.

White Pine.—This tree is so valuable that it is difficult to conceive how its place could be supplied were our white pine forests to become exhausted. With ordinary care to prevent destructive fires, this can hardly ever happen as it grows upon every kind of poor soil, and if the young trees are protected a supply is certain, as the tree is a rapid grower. Intelligent lumberers consider that a white pine forest renews itself every twenty years. It is the tallest of any tree that grows in our forests; it rises in a single straight column from sixty to seventy feet high, and from twenty to thirty inches diameter, five feet from the ground—this we consider a large pine. In the neighboring States and further west in Canada, its height is much greater, being sometimes 200 feet to the branches and five to six feet diameter. Very large pines in Nova Scotia are generally shakey, full of small cracks, probably owing to the high winds which bend the trees backwards and forwards; the position occupied by these trees, generally along the sides of lakes, exposes them to the action of wind.

Yellow Pine, called Hard, Pitch, or Norway Pine.—This I am informed is not the true pitch pine, but the description is very like it. It is a rapid growing tree, has a tall trunk, the bark is in broad scales of a reddish colour, free from lichens. It is found growing on the poor sterile lands of every county in the province, and is highly esteemed for various purposes, particularly as deck plank, and for masts and pumps, and indeed is considered not much inferior to proper Pitch Pine. Formerly there were large trees of this species, but now it would be difficult to find a tree exceeding 18 inches diameter at 5 feet from the ground, and 40 feet of clear stem.

On the sandy plains of Aylesford and Wilmot there are beautiful groves of this tree. The leaves are in twos, five or six inches long, forming large conspicuous tufts or brushes at the end of the branchlets. The young are very handsome in form; the showy tufts of massive dark green foliage contrasted with the lighter green of deciduous trees is particularly beautiful.

Hemlock.—Of this tree we have two kinds, the red and white; the white makes the best quality of boards and is comparatively free from shakes and cracks, but the red is very shakey. It has somewhat the figure of the white pine; the trunk diminishes very little until it reaches the branches, usually from forty to forty-five feet from the ground. The wood is used for the frames of wooden houses, for planks and boards, for boarding in and rough flooring; it is also used for split laths and many

other purposes. All the wharves in Halifax are built of this wood, and the top or covering of the wharves is made of hemlock plank. Boards of white hemlock for many purposes are esteemed equal to white pine—shingles made of the same wood are equal to cedar. It grows upon a better quality of soil than white pine, sometimes upon a clayey, which is very good. The trunk of the hemlock is covered by a reddish grey bark, somewhat rough, with long furrows when old. The bark contains a large quantity of tannin combined with coloring matter, which makes it objectionable for the best kinds of leather. By a simple process the colouring matter may be removed, and the leather is then quite equal to leather prepared with oak bark.

The foliage is much and justly admired for its graceful appearance. In the beginning of summer each twig is terminated with a tuft of yellowish green leaves, surmounted by the darker green of the former year; the effect is an object of beauty it would be difficult to surpass. Of late years this has become a favorite ornamental tree for lawns, and is much admired in Britain.

Mountain Pine.—This tree is only found on the tops of high hills of comparatively bare rock; its leaves are not more than half the length of those of the white pine. It differs from other pines in several particulars,—it is short and scrubbed, the cones which contain the seeds are nearly as hard as bone and mature the third year from the flower. It is too stunted to be of value.

Balsam or Silver Fir.—This is not a large tree, being seldom more than fifteen inches diameter; it is straight and tall and forms with its branches a cone. It is slightly different from, but a nobler tree than, the Silver Fir of Europe, and is commonly known in this Province by the name of Fir. It is not a valuable wood, but is much used for making butter tubs, firkins, etc. The wood is light and does not impart any disagreeable taste to butter. This tree is hardy, easily transplanted, grows rapidly with great vigor—its beautiful green bark and deep green foliage —regular pyramidical form—large upright cones with which the upper branches are often loaded, render it one of the most beautiful of the evergreens. It is short lived, and becomes stiff and ragged in appearance when old; this is its great defect. The balsam forms in tubercles in the bark. It is collected in large quantities, and sold in all drug stores under the name of Canada Balsam or Balsam of Gilead. It is also used for making varnish for indoor work.

Black or Red Spruce.—We have two species of spruce—the black and the white, or, as they are sometimes termed, the double and the single. They are distinct from the fir and hemlock both in the appearance of the bark, the leaves and cones. The trunk of the spruce is perfectly straight, and regularly tapering from the ground to the top, often 70 to 80 feet high, and two feet at the ground; the bark is inclined to be smooth, covered with small scales; the branches are in whorls of six or eight, and as the tree becomes old the scales of the outer bark become more round.

It is not a favorite as an ornamental tree, the outline being harsh and stiff, but the timber is valuable and of very general use. This Province appears peculiarly favorable for the production of spruce. The wood is light and strong, grows rapidly and to a large size, and is of great value for all purposes where any of the pine family may be used, such as ship-building, house-building, shingles, laths, staves, and manufactured into deals is largely exported. For flooring it is the only wood used here, and I believe for that purpose is largely used everywhere.

Beech.—This is a very common tree, and forms the chief supply of firewood. The kind of land termed hardwood land is nearly always covered with beech and a small sprinkling of birch and maple. The flowers are beautiful, in roundish tassels or heads; each flower is a hairy or silky, bell-shaped cup, with its border divided into six segments. The fruit forms on a hairy stalk, and is called beech mast. It is a rich, oily nut, and there is considerable difference in flavour and quality of the fruit of different trees. The beech is of rapid growth, but short lived, compared with the ash or birch. Country people speak of the red and white beech, as they do of black and yellow birch, but there is only one kind of beech in the province. The difference in the appearance of the wood which has given rise to these names is said to be produced by the more or less rapid growth of the wood. The wood of the white beech is more tough and lasting, while the red is more brittle. The mechanical purposes to which the beech wood is suitable is chair-making and turning, and it is preferred to all other wood for plane-stocks, saw-handles, &c., and the white or sap wood is always preferred, being the smoothest and closest grained, and less liable to warp, the red or heart wood being more brittle. In the forest the beech grows to a height of 60 or 70 feet, and about 20 inches in diameter at the ground; but in open pastures it is a low tree, with spreading branches. For a depth of shade it has no equal, and as it is singularly clean and neat, and the leaves not liable to the attack of any insect and vermin, remaining on the branches longer than any other deciduous tree giving a cheerful and sheltered aspect to the wood, it is well deserving the consideration of those who cultivate ornamental trees. Another peculiarity of this tree is that no one has ever known a beech to be struck by lightning. Hedges of beech are very beautiful, and it is very astonishing that in a country where one sees old pastures taken possession of by young beeches no one has ever made an effort to grow a beech hedge. It would grow in about half the time of the common thorn hedge, and present a much more pleasing appearance, and in every way as useful, indeed better, as a shelter.

Hard, Rock or Sugar Maple.—This tree is easily distinguished from the other maples by the roundness of the notch between the lobes of the leaves and the appearance of the bark. The wood is hard and compact, hence the name hard or rock. It is called sugar maple from the sap or juice which it yields. The wood of this tree is very frequently curled, the grain running in small waves, sometimes becoming what is called bird's-eye. This is so called from a contortion of the fibres at irregular

intervals, throwing out a variable point of light, giving the appearance of a roundish projection, having a distant resemblance to the eye of a bird. All the varieties of this wood, particularly the last, are used in the manufacture of articles of furniture, pianos, sideboards, bedsteads, desks, picture frames, &c. It is highly esteemed and preferred to every other wood in the making of lasts, and for this purpose is largely exported to Boston and the neighbouring towns. It is preferred on account of its superior compactness and cohesiveness of its fibre for keels of ships. As fuel the wood of the rock maple holds the first place in this Province; the ashes abound in alkali, and the best charcoal is made from it. Michaux says that the wood of this tree may be easily distinguished from that of the red maple or scarlet maple by pouring a few drops of sulphate of iron upon it. This wood turns greenish; that of the scarlet maple turns a deep blue. The sap or juice which yields the sugar will run from the trees if cut or wounded any warm day after December. It ceases to flow about the middle of April, when the weather becomes so warm as to swell the buds of the trees and loose the bark. The proper season for making sugar is in March. The sap runs only on warm days which are preceded by keen frosty nights. The sap first drawn is always the best; it then yields a pound of sugar to four gallons of sap. The sap last drawn is commonly fit only to make molasses. A sugar maple tree standing in an exposed situation will yield more sugar for the same quantity of sap. The trees ought to be tapped with a chisel or an auger, and not with an axe, as is too common. In a good season fair-sized trees yield from two to three pounds each.

Red Flowering, White or Scarlet Maple.—This tree grows upon almost every kind of soil, it thrives most near the water. It is covered with red flowers very early in the spring, before the leaves appear, and the leaves generally change to red on the approach of autumn. It is harder than the soft maple of New York, but it is much inferior to it for timber, as the grain twists very much. It is sometimes used by chair-makers to turn, but they commonly prefer yellow birch; it makes good fuel when dry, but very indifferent when green.

Moose-Wood Maple.—This is a small tree, very rarely more than four inches diameter. It is not used for any purpose that I know of except for fencing stakes. It is of very quick growth, and the wood is very soft and brittle. Its twigs are the principal winter food of the moose where they can find it, for it does not often grow on very barren land. It is most plentiful near small brooks on stony hemlock lands.

Mountain or Dwarf Maple.—This is not above half the size of the last-mentioned species. It is a very troublesome bush upon new cleared land, as it grows very fast, and it is not easily destroyed.

Black or Yellow Birch.—The bark of this tree when young is of a yellow colour, but as the tree matures the bark becomes dark and the tree is then known as "Black Birch." It is a large tree frequently three feet diameter, but takes a long time to grow, certainly 200 years would be

required to reach a diameter of three feet. It is much used for ship-building, both for timbers and planks, and is not liable to attack by the borer. It is extensively exported as ton timber and is much used by cabinet-makers and turners. It is liable to warp and shrink, but when well seasoned is a useful and beautiful wood for cabinet work. The young trees come up in thick groves and are universally used to make barrel hoops, a large branch of the industry of the country. Cart and waggon wheels as also the frames of waggons and carts are made from it. Ash or oak would be superior for many purposes to birch, but these are not so plentiful, consequently the wood is dearer. Black birch grows on good land, and is said to enrich the land it grows upon. The bark is often used to tan leather, but is inferior for that purpose to hemlock or oak.

White Canoe or Paper Birch.—This tree is of little value. The white stem is very pretty to look at among other trees with dark stems. The outer bark is of great value to the Indians—they make their canoes from this bark sewed on to a light frame made from laths. They also manufacture handsome baskets and boxes, chair bottoms, &c., ornamented with porcupine quills dyed of various colours.

American or White Elm.—There is only one species of the elm in this Province, and only found on the best soils, viz., on river or brook intervales, or low uplands with a deep rich soil. It is now a scarce tree, as heretofore it has been much sought after for ship-building, &c. It is easily transplanted, grows rapidly and to a great size. The American elm effects many different shapes, and all of them beautiful. Fine specimens may be seen about Windsor, at Kentville, and on many of the rivers to the east of Halifax, and on the Marguerite and Mabou rivers in Cape Breton. For beauty and grace of outline, whatever form it may assume, there is no other tree in the province at all to compare with it. It is found from three to five feet diameter, and seventy to ninety feet high. The wood is firm and solid and is highly esteemed for ship-building and other purposes. The bark is tough and strong and heretofore has been used for making ropes and chair bottoms. It makes good fuel and the ashes will yield more potash by 300 per cent. than any other of the hard woods of this province.

Wild or Indian Pear.—This is a species of medlar (Mespilus); it seldom exceeds 6 inches diameter. It grows most commonly on barren land near the water. It is a remarkable flowering tree, and bears very good fruit about the size of cherries; it is, however, very frequently blasted. The wood is very hard and smooth, and is sometimes used for axe helves.

Hornbeam.—This tree grows only upon good lands; it is a small tree—seldom exceeds 8 to 10 inches diameter. It is the hardest and strongest wood we have. It is heavier than water, and sinks in a swift-running stream. It is easily distinguished from the English hornbeam; is well adapted to make levers, rake teeth, cogs in mill wheels, cart stakes, binding poles, &c.; also highly esteemed for axe handles.

Red Oak.—We have but one species of this tree that I have seen; it resembles the red oak in the States, but is harder and stronger. It grows chiefly upon poor land; the best I have seen was upon very sandy intervales. It is more durable when exposed to the weather than any other wood we have. It is used for planks and timbers for ships, for staves, for fish and pork barrels, cart wheels and many other purposes. It is scattered over every part of the Province, but that which is of a size to be valuable is mostly in the eastern district. The red oak is of little value for fuel; the bark is nearly worthless for the use of the tanner. It is, however, a beautiful tree, a rapid grower, and flourishes in every situation, but grows best on a poor, gravelly or sandy soil.

White Ash.—This is a very tall tree, and a very strong and useful kind of wood, except when it grows in cold swamps, where it is soft and brittle. It usually grows on rich lands and by the sides of brooks; it is very light and easy to split. It is the most suitable timber to make handles for tools, ploughs, carriage wheels and for many other purposes. When green it is better fuel than any other we have.

Black Ash.—This grows only in swamps, which, though rich, are sometimes so wet as to require draining to produce grass. The Canada flour barrels are made from this tree, but I have never seen any great quantity of it of a size fit for staves in this Province. It is here used to make baskets. To fit it for this purpose it is beaten with a maul, which separates the grains or year's growth. It makes very bad fuel when green. It is the most slender of all deciduous trees of any considerable magnitude, often attaining a height of 60 feet and not over 6 to 8 inches diameter. When planted in an open plain on good land it spreads out its limbs, forming a broad top, and is a handsome proportioned tree.

Black or Pigeon Cherry.—This tree is very rare except upon intervales; it is not so large in this Province as in the United States further southward, where it is often used to make tables, as it has nearly the colour of mahogany. In Nova Scotia it is seldom more than 10 inches in diameter. The fruit is small, growing in large bunches; it is, when fully ripe, pretty good to eat, and is accounted very good to put in spirits.

Red Cherry.—This tree seldom reaches more than 10 inches; it commonly springs up on dry, stony land after a fire. The fruit is small and very sour.

Choke Cherry.—This is only a bush, being seldom more than 2 inches; it is common upon intervales by the sides of brooks, on rich, moist upland. It has long branches of fruit, rather larger than that of either of the other species, but is scarcely eatable, having a disagreeable astringent taste.

Trembling or Aspen and White Poplar.—These trees differ little from each other; they always grow upon land that has been burnt over. They are tall, but seldom more than 16 inches in diameter. The wood is soft and light, and is used to make trays. It is sometimes sawed into

boards; it is spongy and very bad to saw, and of little value. It makes but poor fuel for common use, yet it is very good for charcoal. Recently a process for manufacturing paper from the aspen poplar and willow has been introduced into this Province. If this enterprise becomes a success it will render a very useless but plentiful tree of some commercial value.

MOUNTAIN ASH or FOWLER'S SERVICE.—This is a small tree, very rarely 6 inches in diameter. It grows most frequently on very poor land. The bark of this has very nearly the same taste as that of the cherry tree. It is the favorite food of the beaver, and I believe it is the natural breeding place of the insect "Aphis," which destroys so many apple trees near Halifax by covering the branches with small nests which resemble lice. I have frequently observed the bark of this tree covered by them in places which were 20 miles from any settlement.

PROVINCE OF NEW BRUNSWICK.

EXPORTS.	1881.	1882.	1883.
Rough products of the forest	$4,068,241	$4,724,422	$4,408,203
Manufactured products of the forest	114,381	259,800	389,947

The principal timber limits or berths, as they are styled in New Brunswick, are enumerated as lying in the counties of Restigouche, Gloucester, Madawaska, Northumberland, Victoria, Carleton, York, Sunbury, Kent, and part of Westmoreland and Queen's. The whole surface of the province in its natural state is, with few exceptions, covered with a dense forest of timber trees. The black spruce constitutes a third part of this, and nowhere is it found of larger size or finer quality, being well known as furnishing the spruce deals of commerce which are amongst the most valuable exports of the province. In the north-eastern portion of New Brunswick the larch abounds, valuable in ship-building, and the clipper ships of this province, built almost wholly of its larch wood, have attained a world-wide celebrity for speed, strength, and durability. Birch, beech, maple, elm and cedar, are abundant all through New Brunswick, and being all in use in ship-building, which is largely carried on at St. Johns, Miramichi, St. Andrew's, Bathurst, and Dalhousie, their timber is always in demand. In some situations the beech is so abundant as to constitute extensive forests, the finest trees growing in a deep moist soil, or level, or gently sloping lands. The birches, beeches, and maples all furnish excellent fuel, the sugar-maple affording the best, and its ashes are rich in the alkaline principle. Charcoal made from it is superior to any other; it is one-fifth heavier than that made from the same species of wood in the middle and southern States, which sufficiently evinces that this tree acquires its characteristic properties in perfection only in a northern climate. Both the red and the white elm are abundant, the former more especially, it delighting in the low humid and substantial soils known as "intervale lands." The red elm, on the contrary, requires a soil free from moisture, and open and elevated situations. The white spruce is

abundant, but its wood is of an inferior quality, although the deals made from it are mixed with those of the black spruce, without distinction. A resin exudes from knots and wounds in the trunk of this tree, whence it is gathered, melted, and boiled to free it from impurities, and it is universally known in the province as "gum," being used for rendering water-tight the seams of water-pails and bark canoes. The balsam or silver fir is found in greater or less abundance all through New Brunswick. As the white pine decreases the silver fir will come more into notice and demand, it having been undervalued when compared with the former. Canada Balsam, which must not be confused with the "gum" mentioned above, is procured from this tree.

The white pine is annually becoming scarcer in this Province, as in all the other Provinces, but is still extensively exported from New Brunswick, not only as square timber, but also in the shape of masts, spars, deals, plank, boards, scantling, clapboards, palings, shingles and laths; also in boxes, barrels, water-pails and tubs. Almost all this timber within reach of the tributaries of the St. John has been cut, except on the streams flowing into that river from Maine. The hemlock or hemlock spruce forms a large proportion of the evergreen forests of the Province, but is only of secondary importance. Large quantities are shipped to Great Britain in the shape of lathwood, from which split laths are made. The butternut is abundant on the rich alluvial banks of the rivers, and considerable quantities of furniture are made from it for home use. Very little is as yet exported, but the large size which it attains here and its various good qualities must soon cause a demand to spring up. There are two species of ash here (the white and the black ash); abundant everywhere. As the wood of these trees differs more owing to soil or situation than that of any other, several varieties have been stated as existing, but a close examination reveals the fact that they may all be referred to one or other of the two species named. It is among the exports of the Province in the form of staves and planks. The black ash is of smaller size than the white ash, and its wood is neither so strong nor so durable, and is not therefore in as great request. Easily separating into strips, it is largely used in the manufacture of baskets. The cedar abounds throughout New Brunswick, the trees standing so thick that the light can hardly penetrate their foliage. It is chiefly exported in the form of posts and palings and railway sleepers, but, as it enters now into the list of woods used for the top timber of the higher class of colonial ships, more attention is given to it than formerly. The oak, of which three species are found in this Province (the white, red and grey), is abundant in the interior, and is in demand for many purposes. The basswood tree grows to a large size in the New Brunswick forests, but is not much valued as timber, and is not extensively used. It grows in large quantities in the northern part of the Province. There are three species of poplar in the Province—the balsam poplar, the American aspen and the common poplar. The wood of the latter is used for saw gates in water-power saw mills, but none of the above trees

are in great demand. The hornbeam or ironwood tree is found in large quantities in various parts of the Province where the soil is deep and rich. Its wood is largely in demand for domestic purposes where toughness and elasticity is required. The wild cherry is common, but its wood is very little used. The willow, of which there are three kinds, known locally as the swamp, the black and the basket willow, are abundant, the two former especially so, and they attain a very large size. The wood is not used for any mechanical purpose. Owing to the disappearance of the white pine, a number of mills in New Brunswick are now engaged in the manufacture of box shooks for Cuba, and a large trade is carried on in that business, the coarser kind of pine being used.

Mr. Ward states as follows, speaking of New Brunswick: "Cut on Government lands equal to 160,000,000 feet of all classes, principally spruce, the pine in this Province, once so famed, being almost exhausted. There being a large extent of private lands in this Province, I think it is safe to estimate that there is not less than 500,000,000 feet of lumber and timber produced, considerably more than three-fourths of which is exported, the balance being for home use. The extent of territory is 17,500,000 acres, ten millions of which is granted and located, leaving seven and one half millions still vacant, and giving to the Province $152,000 for timber dues, ground rent, &c."

PRINCE EDWARD ISLAND.

Exports.	1881.	1882.	1883.
Rough products of the forest.....	$ 42,189	$ 20,098	$ 28,385
Manufactured products of the forest.....	65,424	108,915	154,041

This Province does not produce more lumber than is required for home consumption.

The following is a list of the trees native to the Island, all of which are found in the other Provinces. It is a noteworthy fact that the white cedar is wanting in this list, that tree not being indigenous:—Poplar leaved birch, canoe birch, yellow birch, black birch and red birch, hornbeam, white spruce, Norway spruce, black spruce, mountain maple, rock or sugar maple, striped maple, red maple, black, white, red and green ash, red cedar, beech, larch and tamarac, white elm, ironwood, large aspen, balsam, white and cottonwood poplar, aspen, white pine, cypress or banksian pine, red pine, hemlock spruce, balsam and double balsam, fir, white and yellow willow.

PROVINCE OF MANITOBA AND THE NORTH-WEST TERRITORIES.

(Extract by permission from Professor Macoun's Work on Manitoba and the Great North-West.)

EXPORTS.	1881.	1882.	1883.
Manufactured products of the forest.....	$115	$300	$1,580

The timber supply for the North-West engages at present the attention of many thoughtful men. It is, therefore, necessary to collect in a small space all the information possible on the subject.

On the Lake of the Woods, Rainy River and its tributaries, and along Winnipeg River, there are large areas of forest where much fine timber is still to be had, but in no sense can these areas be called pineries.

Tamarac, white spruce, banksian or scrub pine, Norway pine, white pine and white cedar, are met with in greater or lesser quantities. For such purposes as house-building, fence-posts, railroad ties, or bridge-building there is an ample supply along the line of the C. P. R.. It is true much of it is small, but it is sound and good, and scarcity enhances the value. When lumber of any kind brings $20 per thousand, small size and presence of knots will never condemn the material. The various species of pine are on the sandy ridges dividing the swamps, while the tamarac and black spruce are found in the swamps. At Rat Portage and Eagle River are saw mills which manufacture large quantities of material used on the C. P. R., and much that is distributed over the country as far west as Portage la Prairie.

Beren's River, about half way up the east shore of Lake Winnipeg, drains a large district of country, and along its banks there are known to exist considerable areas of pine lands, but whether banksian or red pine is the prevailing species, our limited knowledge prevents us from ascertaining.

No matter what interested or other persons may state, red and white pine cease on the east side of Lake Winnipeg, and the only species found west of that is the banksian pine (*Pinus Banksiana*). White cedar (*Thuga Occidentalis*) is found in small quantities on the shores of Cedar Lake, north of the head of Winnipegoosis, but no further west. The following list of the trees of the plains and the northern forests may be relied on as absolutely correct:

WHITE SPRUCE (*Abies Alba*) may be considered the most important tree throughout the North-West. Neither its habit nor habitat are in accord with eastern ideas. In its northern home it is a stately tree, rising, with little diminution in size, to the height of 100 feet, and often having a diameter of nearly four feet. It is no uncommon occurrence to see fifty trees to an acre, averaging thirty inches in diameter. Its habitat, instead of being on sand or in wet swamps, is always on the mossy sloping-bank or side-hill or on the alluvial flats along a river.

Black Spruce (*Abies nigra*) is an important tree, north of lat. 54°. It is a curious fact that the writer never saw this species a foot in diameter in any part of Ontario, but after passing north of lat. 54° it was found nearly three feet in diameter south of Green Lake. As this is certainly the most northern species of fir, it is probable that the spruce forests, north of lat. 57°, may be composed exclusively of this tree. In Ontario, it loves the deep, cool, peaty swamp, but west of Prince Albert it leaves the bogs and is found on dry but mossy ground.

Banksian Pine (*Pinus Banksiana*) has often been confounded with Norway or Red Pine. It and *Pinus contorta* are the "Cypre" of the Half-breeds. The Cypress Hills get their name from the groves of the latter species at their western extremity. The former loves almost pure sand for a habitat, and hence, wherever there is a barren or sandy tract in the forest region of the North-West, this species is sure to be there. It is seen at Point-aux-Pins, west of Sault Ste. Marie, and attains a large size in many places along the Dawson Route, west of Lake Superior, and along the Thunder Bay Branch of the C. P. R. to and beyond Rat Portage. It is common between Duck Lake and Prince Albert, and near Fort à la Corné and in all the sandy country west and north of the Saskatchewan River.

Cypress, Sugar Pine, Black Pine or Twisted Pine (*Pinus Contorta*) grows in fine and extensive groves on the western end of the Cypress Hills, but disappears about 500 feet below the summit or 3,500 feet above the sea. About the same altitude, on suitable soil (it delights in poor soil,) it is found along the eastern base of the Rockies, as far north as lat. 56°. In northern British Columbia, it is the most abundant forest tree. Neither of the last two species ever attain a large size, being seldom over eighteen inches in diameter.

Balsam Poplar (*Populus balsamifera*) is a very important tree, both as regards its size and distribution. In the forest region where the soil is permanently damp or subject to overflow at certain seasons of the year, it takes the place of the Aspen. In all river valleys it is the most valuable tree, as it attains a large size and makes excellent lumber. Large quantities of boards were manufactured from logs cut in the Assiniboine Valley, above Portage la Prairie, in 1879. It is on Peace River, the Liard and the Mackenzie, where this tree assumes those dimensions which cause it to be reckoned the king of the northern forests. Here, a diameter of from six to eight feet is not uncommon, and trees from sixty to one hundred feet in height without a branch are found in groves. It is a curious fact that this tree delights in the alluvial flats along the northern rivers, and not one aspen is ever found in this situation. It was only when we saw the aspen that we knew we were on the old bank of the Peace and Athabaska, when traversing the deltas of these rivers. Trees of this species are larger on the Liard in lat. 61° than anywhere else, and fine forests of it grow down the Mackenzie, north of the Arctic Circle, at Fort Good Hope.

Aspen Poplar (*Populus tremuloides*) may be called the characteristic tree of the plains. Wherever there is dry soil, not too sandy, outside of alluvium, there is aspen. I have passed repeatedly from aspen "bluffs" on the prairies, not twenty feet high, and with the trees not thicker than a walking stick, to continuous forests of stately trees, with their white trunks towering to the skies. Each time I have noticed that the forest was only kept in check by the annual fires. Until the willow and aspen roots had lost their vitality, they persisted in sending up crop after crop of stems ever increasing in number, until death by exhaustion took place and permanent prairie was formed. It has been frequently stated that aspen seeds remain in the soil, but this is not so. The reason it reclothes the ground so many times after being swept off by fire, is the fact that it throws up shoots from every root after a fire has killed the stem. It possesses this quality, in common with all members of the Willow family, which it is well known grow indiscriminately from either roots or planted stems, and very seldom from seeds. This provision seems necessary to this order (*Salicaceæ*), as in all cases the flowers are dicecious and two trees in close proximity are necessary to perfect the seed. Two notable instances of this are found in the White Poplar (*Populus alba*) and Lombardy Poplar, which produce no fertile seed in the absence of the staminate tree.

The Cottonwood (*Populus monilifera*) is found in the deep river valleys of the "Great Plains," and occasionally amongst sand hills, but in no place is it so abundant as to deserve particular notice for its economic importance, though, when found, it is usually of large size. It is the last remnant of the former forests of the south. Its thick coarse bark, like that of the oak, preserves it from the repeated assaults of the annual fires, and enables it to escape when thin-barked trees succumb.

The Oak (*Quercus macrocarpa var.*) grows to a large size in many parts of Manitoba, but it is unknown to the west of it. In that part of Manitoba, south of the Assiniboine and west of the Pembina Mountain, there are numerous groves of fine trees and much of the timber is valuable for a variety of purposes. It is also common on the White Mud River, and is frequently seen in groves along Lake Manitoba.

Elm (*Ulmus Americana*) is never found outside of river bottoms, except along Lakes Manitoba and Winnipegoosis. It grows to a very large size in the valleys of the Red and Assiniboine Rivers, and often forms groves of large extent. In lat. 53°, along the Red Deer River, which empties into the northern end of Lake Winnipegoosis, are large groves of very fine elms often four feet in diameter. It is found in some abundance on Carrot River and the Saskatchewan, but is confined to low alluvial flats.

Ash (*Fraxinus pubescens*) grows in the valleys of the Assiniboine and Red Rivers, often forming groves, but the timber, though frequently tall, never attains a large size. It is scattered throughout all the prairie country, and is found as a small tree in the river valleys and along the broken face of the Coteau and Cypress Hills. It is of no value for timber, but makes excellent firewood even when green.

"SUGAR MAPLE," or Ash Leaved Maple (*Negundo aceroides*) is found in more or less abundance in all the river valleys, as far west as the 110th meridian, and probably farther. When dry, it makes good firewood, but the fact that it becomes very crooked with age, in the wild state, prevents it from being of any value as a timber tree, even if it should attain the dimensions of one. Indians frequently make sugar from its sap, but the amount made is of little account, as groves of this tree are infrequent in most localities.

In the foregoing synopsis, all species peculiar to the plains have been noticed, except Tamarac (*Larix Americana*) and Black Willow (*Salix nigra*). The latter frequently becomes a tree in the river valleys, but is scarce and of no value as wood, for it rots in the centre long before it shows signs of decay on the outside. The Tamarac forms fine groves of tall, straight trees in many parts, especially on the watersheds, and in basin-like depressions found in the northern forests. In the swamps the trees are generally small, but on the drier margins and mixing with the White Spruce on the hill sides or in river valleys are numerous fine trees often forming groves of many acres in extent. Birch (*Betula papyracea*) is frequent in the north, and a very excellent syrup is made from its sap by the Northern Indians in spring.

Along the rivers flowing into Lake Winnipegoosis, on islands in that Lake, on the Fairford River, and at Ebb and Flow Lake are fine groves of spruce untouched, except by Mr. Pratt, who owns a saw mill at Totogon. Enough Spruce grows in the neighborhood of these lakes to supply the country to the south for many years. Were saw-mills erected at Lake Francis, the southern end of Lake Manitoba, and a tramway built thence to the C. P. R.—less than eight miles—a never failing source of supply to the whole country would be opened up. Besides the above, very valuable timber—Spruce, Aspen, Tamarac and Balsam Poplar—grows continuously along the eastern face of the Riding and Duck Mountains. All this timber can be drawn to the before mentioned lakes, and so reach a market without difficulty.

Rapid City, Minnedosa and Odanah will receive their supply from the Riding Mountain by the Little Saskatchewan, while Birtle and the adjoining country will obtain theirs from the same region, by means of Bird Tail Creek, on which there is a saw mill at present. Shell River penetrates the Duck Mountain, and fine Spruce was floated down this river and the Assiniboine to Brandon last fall, where it is now being sawn into lumber for the use of settlers. On the head waters of the Assiniboine, there are groves of great extent in which, besides Spruce and Tamarac, both species of Poplar attain a large size.

My own observations and all the knowledge I could pick up from other sources lead me to believe that valuable Spruce and Poplar forests are found around every point of the Porcupine Mountain. I know that the eastern and Northern sides are continuous Spruce forests, along the base and far up the slopes. At the southern end I penetrated the hills, and found fine Spruce in groves of very considerable size occupying the slopes

of the hilly or undulating country where I was, and forests crowning their summits.

Dr. Bell's assistant reached the top of the range at the head of Salt-River, and reported spruce trees 42 inches in diameter. Dr. Smith, who explored here in 1879, says :—

"Careful exploration of the country north of the Reserve, for 12 miles, revealed a magnificent district, land excellent and much large Poplar, 24 to 30 inches in diameter. This was the character of all the region from the junction of Thunder Bay with Moody River and far northward, while southward, there was a stretch of rich but wet land extending to Swan River. Westward of the Reserve, the country was heavily wooded with very fine timber, Poplar, Spruce and Tamarac." The country spoken of above was that to the north and west of Thunder Hill on Swan River.

From a point, a little east of Fort à la Corné, and northwards, toward Green Lake, valuable Spruce, Tamarac and Poplar forests, without a break, extend westward to near Lac la Biche. North-east of Carleton and north of Prince Albert are fine forests which are easy of access at present and on that account more valuable than those further north.

Much fine Spruce exists in the valley of the Athabaska and on its upper tributaries, but, without the aid of a railway, as the river flows to the north it will be of little value for commercial purposes.

Above Edmonton, on the Brazeau and all the upper tributaries of it and the north Saskatchewan, are fine forests of Spruce, Tamarac and Balsam Poplar. Here a large area will be found, well suited for lumbering purposes, as it is protected from fire by numerous marshes, and up to the present has remained in a primitive state.

Returning to the south, we find wood of considerable value in many parts of south-western Manitoba; as much of this has fallen into private hands, it will be well preserved and become invaluable in the course of a few years. Oak and Poplar are the principal trees. On Little Cypress River, which flows into the Assiniboine, there is some Spruce. At Milford, on Cypress River, a saw mill has been built, which is a great boon to the settlers in the vicinity.

On Turtle Mountain and Moose Mountain, Aspen and Balsam Poplar, large enough to be sawn into boards, are to be found in considerable quantity, and most probably some enterprising individual will start a "city" by building a saw mill at one of those points.

As I have remarked in another place, there is a large quantity of "Cypre" (*Pinus Contorta*) between Fort Walsh and the western end of the Cypress Hills, but more especially within the Assiniboine Reserve, at the "head of the Mountain." The trees are all tall and straight, but the greater portion does not average above a foot in diameter, although many may reach eighteen inches. With care, this tree could be made available for many years for the stockmen and others coming into the country.

On the St. Mary's River, close to the boundary, Dr. G. M. Dawson saw *Pinus contorta* in some abundance, but not of large size.

Towards the heads of other branches of Belly River, Col. McLeod says, "good Pine is found on the slopes of the mountains and for some distance from their base, while Cottonwood trees of good size grow along the river bottoms."

While in the mountains at Bow River in 1879, I made a careful examination of the timber in the valley, as far as time would permit. The principal species were Douglas Pine and beautiful Spruce, the latter growing tall and straight and forming groves on the flats. The other species preferred the rocky slopes, and were often of a large size, numbers being seen three feet in diameter. Fine groves of timber were observed on the south side of the Bow River, from the mouth of the Kananaskis up its pass and over the mountains between the two rivers. From the situation of the timber, I believe it to be principally Douglas Pine. I was informed that much finer timber could be seen higher up the river. By being carefully husbanded there is enough timber on the river and its tributaries to supply all the prairie country as far as the Elbow of the South Saskatchewan. All the water-power necessary to convert it into lumber exists close to Morleyville. The river is so placid for its whole length that the lumber could be rafted to any point without loss.

In the Pheasant and File Hills, and throughout the Touchwood Hills, as also a tract of country lying east of Humboldt, there is abundance of wood for the prairie settlers for many miles on all sides of the hills. This wood is Poplar of two species, and can be used in house building for walls, roofs and floors.

West of the Saskatchewan the Eagle Hills will furnish a supply for the northern part of the Great Plain. Battle River, throughout its entire length, will supply wood for all purposes to the country on both sides of it. Spruce in some abundance can be obtained on its upper waters and floated down to any required point. Red Deer River passes through a country more or less covered with forest, as far south as lat. 52°, but, after that, to its confluence with Bow River, the only wood in the country it passes through is found in its own valley, or its bordering *coulees*. This is so small in quantity, in comparison to the district to be supplied, that it need merely to be mentioned, but not taken into account. No doubt large quantities of Spruce exist on the upper waters of the river, and can be floated down to any point on the stream. There are no obstructions of any kind anywhere in the river, but on the lower part of its course it would be extremely difficult to get loaded waggons out of the valley which is not less than 500 feet deep.

Bow River, on the other hand, does not flow through forest on any part of its course east of the mountains, yet it contains many fine groves of Poplar from a few miles below the Blackfoot Crossing to the mountains, both in its valley and the *coulees* opening into it. Balsam Poplar and Cottonwood (*Populus monilifera*) are found of a large size at the Blackfoot Crossing, and numerous groves of Spruce are seen above Cal-

gary. The whole country, on both sides of the river, is absolutely without wood, except in the tributary valleys, on the south of the main stream. Quantities of very good Spruce and Douglas Pine can be obtained on Dead Man's River on the north, on the Kananaskis on the south, and up the valley of the main stream for at least sixty miles above Morleyville. No difficulty will be experienced in floating down either logs or boards, as the river for many miles into the Rocky Mountains is free from dangerous rapids.

It will be seen by the foregoing remarks that wood is scarce in the southern part of the prairie section.

Mr. Ward states that the annual product of Manitoba and the North-West Territories may be set down at 75,000,000 feet.

BRITISH COLUMBIA.

Exports.	1881.	1882.	1883.
Rough products of the forest.....	$162,747	$362,871	$407,634

British Columbia is amply and well provided with wood for construction and for other purposes, but the Coast Region of the Province has the pre-eminence at present, owing to its facilities for export. The great stores of forest wealth in British Columbia must lead, sooner or later, to a very large trade.

The West Cascade region is densely wooded, chiefly with many species of gigantic conifers, but a large part of the East Cascade region is generally unwooded, or only thinly covered. The rivers of this Province, generally speaking, are not well adapted for logging purposes, being interrupted frequently by rapids, being compressed between rocky walls, and being apt to rise and fall with great rapidity. The West Cascade region is difficult to traverse, and has only been partially explored with regard to its lumbering qualifications.

An official pamphlet published by the Provincial Government gives the following list of the principal trees of British Columbia:—

"Douglas Pine, Douglas Fir, and commercially Oregon Pine; Western Hemlock, Englemann's Spruce, tall, straight, over three feet in diameter. Eastern part of Province and interior plateau forming dense forests in the mountains. Menzies Spruce, very large, mostly on coast. Great Silver Fir, coast tree of great size. Balsam Spruce abounds in Gold and Selkirk ranges, and east of McLeod's Lake. Williamson's Alpine Hemlock, too scarce and too high up to be of much use. Red Pine, Yellow Pine and Pitch Pine, a variety of the heavy yellow pine of California and Oregon, very handsome; four feet in diameter. White Pine (Mountain Pine) Columbia region—Shuswap and Adam's Lakes—interior of Vancouver Island. White barked Pine, small. Western Cedar (Giant Cedar

or Red Cedar), wood pale, yellowish or reddish color—very durable—often found 100 to 150 feet high and 15 feet thick. Yellow Cypress (Yellow Cedar), mainland coast, Vancouver and Queen Charlotte Islands. Western Larch (Tamarac), Rocky Mountains, Selkirk and Gold ranges, west to Okanagan Lake, large tree, yielding a strong, coarse, durable wook. Maple, valuable hard wood; Vancouver and adjacent Islands, Queen Charlotte's, ditto, and mainland coast, up to 55°, attains a diameter of four feet. Vine Maple, very strong, tough white wood, confined to coast. Yew, Vancouver and opposite mainland shores, very tough and hard and of a beautiful rose colour. Crab Apple, all along the coasts; wood very hard; takes good polish and withstands great wear. Alder, two feet thick on the Lower Fraser; good furniture wood. Western Birch, Paper or Canoe Birch, Columbia region, Upper Fraser, Peace River; range and value not much known. Oak, Vancouver Island mostly; seventy feet in height, three feet in diameter. Dogwood, Vancouver and coast opposite. Arbutus, close grained, heavy, resembling box; reaches fifty feet in height and twenty inches in diameter; found on Vancouver and neighbouring islands. Aspen Poplar abounds over the whole interior, reaching a thickness of two feet. Three other varieties of Poplars are found, commonly included under the name of Cottonwood. One does not extend above Yale, and is the same wood largely used in Puget Sound to make staves for sugar barrels for San Francisco. The other two kinds occur in valleys in the interior. Mountain Ash, in the interior. Juniper, Red Cedar or Pencil Cedar, east coast Vancouver and along the shores of Kamloops and other lakes in interior."

Dr. Dawson gives in the Geological Survey Report for 1879-80 a list of trees, and goes very fully into the limits of their habitat. The substance of his report is condensed as far as consistent with practical information.

Douglas Spruce or Oregon Pine (*Pseudotsuga Douglassii*) is the most important timber tree of British Columbia, and the only one of which the wood has yet become an article of export on a large scale. It is found in all parts of Vancouver Island with the exception of the exposed coast, but is not found in Queen Charlotte Islands. On the mainland near the 49th parallel it extends from the sea to the Rocky Mountains, growing in a stunted form at a height of 600 feet. In the dry southern parts of the interior it is confined to the higher uplands between the various river valleys. Northward it comes down to the general level of the country. It does not extend into the mountainous and humid region of Cariboo, and is probably absent from the higher portions of the Selkirk and Gold ranges. Its northern limit is singularly irregular. It occurs abundantly on the coast as far north as opposite the north end of Vancouver Island, but beyond that is only found on the shores of inlets at some distance from the sea. The best grown specimens are found near the coast. Here it frequently surpasses eight feet in diameter at a considerable height from the ground, and attains a height of from 200 to 300 feet, forming dark and prodigious forests. The wood varies considerably in appearance and strength,

according to locality. It is admirably adapted for all ordinary purposes of construction and for shipbuilding, remaining sound in water for a long time. For spars and masts it is unsurpassed both as to strength, straightness and length. Masts for export are hewn octagonally from twenty to thirty-two inches in diameter and 60 to 100 in length, whilst on special orders they have been cut 42 inches by 120 feet, and yards 12 to 24 inches by 50 to 120 feet long. These are generally sent to Great Britain.

Western Hemlock (*Tsuga Mertensiana*) occurs everywhere in the vicinity of the coast, and up the Fraser and other rivers to the limit of the region of abundant rainfall. It attains a large size on the coast, reaching a height of 200 feet, and yields a good wood not yet much used. It closely resembles the Eastern Hemlock, but attains a much larger size.

Williamson's Hemlock, only little known was found by Mr. Sargent on Silver Mountain at an elevation of from 400 to 500 feet, and is essentially alpine in its habits.

Red Cedar, or Western Arbor Vitae (*Thuja gigantea*)—This nearly follows the Hemlock in its distribution, abounding along the coast and lower parts of the rivers of the Coast range. It is unknown in the dry central plateau, but re-appears in the slopes of the Selkirk and Gold ranges, on Shuswap Lake, and in the North Thompson valley. On the coast it not unfrequently surpasses fifteen feet in diameter, and attains a height of 100 to 150 feet, but the large trees are apt to be hollow. The wood is good, pale yellow or red and very durable; it is not yet much used except for shingles.

Engelman's Spruce (*Picea Engelmanni*)—This tree frequently surpasses three feet in diameter, and runs up tall, straight, and to a great height. It appears to characterise the interior plateau and eastern part of the Province, with the exception of the dry southern portions, and forms dense forests in the mountains. The wood has not yet been extensively used, but is excellent, and very durable.

Menzies Spruce (*Picea Menziesii*)—This tree is confined to the immediate vicinity of the coast, where it attains a very large size, and is used for lumbering purposes. Its wood is white and fine.

Spruce (*Abies grandis*)—This has no common name, is confined to the vicinity of the coast, where its range appears to be even more strictly limited than the Cedar or Hemlock. The wood is white and soft, but too brittle for ordinary purposes, and moreover, liable to decay rapidly. It grows to a large size.

Balsam Spruce (*Abies subalpina*)—This is abundant in Gold and Selkirk ranges, and in the region east of the coast ranges, but is not found in the southern dry interior plateau. It the northern portion it occurs in scattered groves. It often exceeds two feet in diameter, but the wood is comparatively worthless.

Spruce (*Abies Amabilis*)—Little is known of this tree which is placed on the list on the authority of Mr. Sargent.

Yellow, Red or Pitch Pine (*Pinus Ponderosa*)—A remarkably hand-

some tree, growing only in the central dry region of the Province. It is extensively used, yielding sawn lumber of good appearance but rather brittle, and not very durable when exposed to the weather. Its diameter does not exceed four feet, though further south it is said to reach a diameter of from twelve to fifteen feet.

Western Scrub, Bull or Black Pine (*Pinus contorta*)—This is met with from the sea coast to the eastern slope of the Rocky Mountains, densely covering large areas, and is the characteristic tree of the northern part of the interior plateau. The trees attain a height of from 60 to 100 feet, but rarely exceed two feet in diameter. The wood is seldom used as lumber on account of its small size, is white and fairly durable. A layer of its bark contains a large proportion of sugar, which is eaten by the Indians.

White or White Barked Pine (*Pinus albicaulis*)—A small tree, and generally in unaccessible situations. Wood not used owing to this circumstance. The seeds are used as food by the Indians.

White Pine (*Pinus monticola*)—This tree resembles its namesake of the eastern Provinces, but is not considered equal to the latter. It is abundant in the interior of Vancouver Island, and in all parts of the southern portion of the Coast Range where there is abundant rainfall. It attains sixty to eighty feet in height, with a diameter of two or three feet, but grows generally in very inaccessible situations. Its wood is coming rapidly into use.

Yellow Cypress or Cedar (*Chamæcypares Nutkaensis*)—This tree is confined to the coast vicinity of the mainland, and to the interior of Vancouver Island, and is abundant in some parts of the Queen Charlotte Islands. It often exceeds six feet in diameter. The wood is strong, free and of fine grain, with a pale yellow tint, very durable, and has been used to a limited extent for boat building and for various ornamental purposes. It is as yet comparatively unknown in commerce.

Western Larch (*Larix occidentalis*)—The limit of this tree is coexistent with that of abundant rainfall, but is not found on the coast. The timber is strong and durable, but coarse.

Lyals Larch (*Larix Lyallii*).—Found in the Galton range, but very little known.

Yew Tree (*Taxus brevifolia*)—This tree occurs on Vancouver Island and on the shores of the mainland adjacent, attaining sometimes a diameter of two feet. It yields a very tough hard wood of a beautiful rose colour, employed for various ornamental purposes.

Red Cedar, Juniper or Savin (*Juniperus Virginiana*)—This is commonly known as Pencil Cedar. It attains a diameter of one foot, and grows along the shores of Kamloops, Francois and other lakes. It is found at Esquimault and Departure Bay, Vancouver Island.

Maple (*Acer macrophyllum*)—This tree grows sparingly on the coast on Vancouver and adjacent islands, on the Queen Charlotte Islands, but never inland. Occasionally attains a diameter of four feet. A valuable hard wood, well adapted for cabinet-making and for fuel.

Vine Maple (*Acer circinatum*)—This tree, like the last, is strictly confined to the vicinity of the coast, but does not extend far to the north. It seldom exceeds one foot in diameter, yields a tough, strong wood, used in the absence of ash for the manufacture of handles, helves, &c.

Crab Apple (*Pirus rivularis*)—This tree grows along the whole coast of the mainland, and in Vancouver and Queen Charlotte Islands. It is a tree of small growth, with very hard wood, susceptible of good polish and especially valuable in those parts of mill machinery intended to stand great wear.

Mountain Ash (*Pirus sambucifolia*)—Only a small-sized tree, sparingly met with in the interior, and not used for timber.

Service Berry (*Amalanchier alnifolia*)—This is more of a shrub than a tree, abundant in the interior plateau and on Vancouver Island. The wood is hard and used for various purposes by the Indians. It produces berries which are dried and stored away in large quantities for winter use.

Oak (*Quercus garryana*)—This tree is by no means abundant, but is found on Vancouver Island and near Yale. It attains a height of about seventy feet with a diameter of three feet. Wood hard but not tough.

Alder (*Alnus rubra*)—This tree attains considerable size on Vancouver and Queen Charlotte Islands and the coast of the mainland. On the Lower Fraser it is sometimes found two feet in diameter. The wood is easily worked, is well adapted for turning, and takes a good polish. It is largely employed in Portland, Oregon, for the manufacture of furniture. It is also largely manufactured into charcoal.

Western Birch (*Betula occidentalis*)—This is a small tree belonging to the dry interior region.

Paper Birch (*Betula papyracea*)—This tree occurs in a number of localities, but neither of these trees are used for timber purposes.

Aspen Poplar (*Populus tremuloides*) abounds over the whole of the interior, and is characteristic of the most fertile lands. It forms the usual second growth after fires. It attains a diameter of two feet, but its wood is very little used.

Cottonwood (*Populus trichocarpa*)—A variety of Poplars are included under this name, found in the valleys of streams and rivers throughout the Province, and attaining sometimes a diameter of from four to five feet. The wood is used at some places on Puget Sound in the manufacture of staves for sugar barrels which are used at San Francisco for the Sandwich Island crop.

Arbutus (*Arbutus Menziesii*)—This tree is met with on Vancouver and the neighbouring islands. It is a very handsome evergreen, yielding a white close-grained heavy wood, resembling box, and which could be used for the same purpose as the latter. It attains a diameter of from eighteen inches to two feet, and a height of fifty feet.

Dogwood (*Cornus nuttallii*)—This tree grows on Vancouver Island and on the mainland adjacent. Its wood is close-grained and very hard.

The above synopsis of Dr. Dawson's list of trees of British Columbia conveys only a faint idea of the capabilities this Province offers to the lumbermen of the future, and the rapid consumption of timber and partial denudation of the forests of the eastern Provinces will give an impetus to this branch of trade which, from the conveniences for export and access by railway to the treeless districts east of the Rocky Mountains, must constitute one of the principal industries of this Province.

Mr. Ward remarks on its lumber products as follows:

British Columbia is credited in the last census with producing 24,043,877 cubic feet of white and red pine in addition to 3,291,043 saw logs—which at an average of say 150 feet each, making nearly 500,000,000 feet, b. m., besides 86,000 cords of lath and firewood. The quantity of hewn timber is almost double that made last year in the older provinces, and one-fourth as many logs. This is certainly a large yield to be produced in a province credited with a population of less than 50,000 souls, the two districts of Yale and New Westminster with a population of 25,000 producing nearly the whole of this large quantity of timber and logs, the total value of her forest exports being only $362,871, or a small portion of the value of the timber and lumber placed to her credit in the census.

TIMBER LIMITS—REGULATIONS.

The progressive demand for rough and manufactured timber has given an enormous value within the last decade to timber limits, and as a natural result, explorations have been pushed far into the back country and regions long neglected have acquired a commercial value. Timber limits vary in size, according to the standing of the lessee, many of the larger lumbering establishments holding hundreds of square miles. The Governments of both Ontario and Quebec never relinquish their proprietary rights, they invariably retain the *feud* or proprietary right, merely using the usufruct. The leasing of these limits in Ontario and Quebec is sold by auction or at private sale, at so much the square mile. Licenses have to be renewed annually, and the license holders pay an annual ground rent of two dollars per mile. In addition to this, all timber, saw-logs, wood or lumber of any kind cut under license in Ontario is subject to the payment of the following Crown dues:

ONTARIO.

	$ c.
Black Walnut and Oak, per cubic foot	0 03
Elm, Ash, Tamarac and Maple, per cubic foot	0 02
Red and White Pine, Birch, Basswood, Cedar, Buttonwood and Cottonwood, and all Boom Timber, per cubic foot	0 01½
All other Woods	0 01
Red and White Pine, Basswood, Buttonwood and Cottonwood, saw-logs, per standard of 200 feet board measure	0 15
Walnut, Oak and Maple, saw-logs, per standard of 200 feet board measure	0 25
Hemlock, Spruce and other Woods, per standard of 200 feet board measure	0 10

	$ c.
All unmeasured cull [saw-logs to be taken at the average of the lot, and to be charged for at the same rate.	
Staves, Pipe, per mile	7 00
do. West India, per mile	2 25
Cordwood (hard) per cord	0 20
do. (soft) do.	0 12½
Hemlock, Tan Bark, per cord	0 30

Railway Timber, Knees, &c., to be charged 15 per cent. *ad valorem.*

QUEBEC.

All timber cut under license to be subject to the following tariff of timber dues, viz.:

	$ c.
Oak and Walnut, per cubic foot	0 04
Maple, Elm, Ash and Tamarac, Red and White Pine, Birch, Basswood, Cedar, Spruce and other square timber	0 02
Pine logs 13½ feet long, measuring 17 inches or more in least diameter, including culls, each	0 22
Pine logs 13½ feet long, measuring less than 17 inches in least diameter, including culls, each	0 11
Spruce logs 13½ feet long, each	0 05½
Staves, Pipe, per thousand	7 00
do. W. I. do.	2 25
Cordwood (hard) per cord	0 16
do. (soft) do.	0 08
Cedar Rails 10 to 12 feet in length, per 100	0 25
Cedar Pickets, per 100	0 15
Cedar or Pine Shingles, short, per 1,000	0 08
Cedar or Pine Shingles, long, per 1,000	0 15
Cedar Telegraph Poles, each	0 06
Cedar Fence Posts, per foot in length	0 00½
Cedar Poles for block fence, per foot in length	0 00½
Cedar Hop Poles, per 100	0 20
Rails of other Wood than Cedar, per 100	0 10
Pickets of other Wood than Cedar per 100	0 05
Railroad Ties of any kind of timber, each	0 02
Hemlock Lathwood, per cord	0 15
Hemlock Bark, per cord	0 32
Hemlock Logs 13½ feet in length, each	0 06
Balsam Logs, 13½ feet in length, each	0 05
Hardwood Logs, round, same as Pine, each	0 22
Tamarac Logs, round, same as Pine, each	0 22
Floors of Birch, generally 28 feet in length, each	25@30c
Knees, according to size, each	5@25c
Futtocks, according to size, each	10@35c
Cedar for Shingles, per cord	0 16
Pine for Shingles, per cord	0 20
Boom Timber, Spruce, round or sided, per lineal foot	0 00½
Boom, Timber, Pine or Tamarac, round or sided, per lineal foot	0 01
Small round Spruce Spars, less than 10 inches in diameter, per lineal foot	0 00½
Small round Pine or Tamarac Spars, less than 10 inches in diameter, per lineal foot	0 00½
White Birch, per cord	0 30

Pine trees under twelve inches in diameter are prohibited from being cut.

NEW BRUNSWICK.

In New Brunswick timber limits rarely bring over the upset price of $8 per mile, subject to the following "stumpage" on dues:

	$ c.
Spruce and Pine Saw Logs, per M. superficial feet	1 00
Hardwood Timber, up to an average of 14 inches square, per ton	0 90
Hardwood Timber, above 14 inches, per inch additional per ton	0 10
Pine Timber, up to 14 inches square, per ton	1 00
Pine Timber, additional for each inch, per ton	0 25
Hacmatac Timber, per ton	0 50
Spruce Timber, per ton	0 50
Cedar Logs, per M. superficial feet	0 80
Railway Ties, each	0 02
Boom Poles, each	0 04
Shingles, Per M	0 20
Spruce or Pine Spars, per lineal foot	0 01
Hemlock, per M. superficial feet (after 31st March, 1884,)	0 60

And for all other descriptions of Lumber, such as Knees, &c., &c., twelve and one-half per cent. of the market value thereof at the mill, place of shipment or place of consumption in the Province.

During each succeeding year for which the License is renewed, it shall be as follows:—

	$ c.
Spruce and Pine Saw Logs, per M. superficial feet	1 25
Hardwood Timber, up to an average of 14 inches square, per ton	0 90
Hardwood Timber, above 14 inches, per inch additional per ton	0 10
Pine timber, up to 14 inches square, per ton	1 00
Pine timber additional per inch, per ton	0 25
Hacmatac Timber, per ton	0 50
Spruce Timber, per ton	0 50

And all other descriptions of Lumber as may be fixed by Regulation.

Spruce and Pine are prohibited from being cut which will not make a log at least eighteen feet in length, and ten inches at the small end.

NOVA SCOTIA.

In Nova Scotia there are no rules or regulations under which licenses can issue. To procure the right in that Province to carry on lumbering operations, the land itself must be purchased from the Crown.

MANITOBA AND THE N. W. TERRITORIES.

In Manitoba and the North-West Territories and on all other Dominion lands held by the Federal Governments, there is a ground rent of $5 per square mile, and a royalty of five per cent. on the amount of the sales of all products of each limit or berth.

BRITISH COLUMBIA.

In British Columbia there are no regulations, but the land must be purchased outright before any timber can be cut.

There is a Dominion Act of Parliament, 42 Vic., cap. 31, prohibiting under heavy penalties wanton destruction of standing timber, and calling for a strict and constant watchfulness to prevent the occurrence of fires in the woods.

This is supplemented by a Provincial Act of the Quebec Legislature, 34 Vic., cap. 19 (1871), fixing the time for fallow-burning and protecting the forests from fire, and another still more stringent Act, 46 Vic., cap. 10 (1883), by a Provincial Act of the Ontario Legislature, 41 Vic., cap. 23 (1878), and by a New Brunswick Act of the Revised Statutes of that Province, cap. 107 (1877). All of the above Acts specify heavy penalties for their infringement.

CANADIAN TREES AND THEIR WOODS.

The extent of our forests is not more remarkable than the various kinds of trees which compose them. Some species are not only very widely diffused, but are also persistent over great areas, being found almost everywhere within the limits of their distribution, while others, although having an extensive range, are nowhere very common, and are sometimes absent for considerable intervals. Others again are confined to comparatively small tracts. As a general rule, says Dr. Bell in his report in the Geological Survey proceedings of 1879-80, the more northern species occupy the greatest extent of country, while the southern ones are progressively more and more restricted even in a more rapid ratio than would be implied by the narrowing of the continent from north to south. This is owing to the great differences experienced in climatic conditions in going from east to west in the more southern latitudes. Some kinds of trees in approaching their northern limits, show a tendency to diminish gradually in size, and to become more and more scattered, rendering it difficult to draw any boundary of the species, while others vanish abruptly. The latter habit is more characteristic of southern than northern species, as far as the Dominion is concerned. The various species appear to die out more gradually as they range northward in the western than in the eastern regions.

Forest trees east of the Rocky Mountains may be divided, says Dr. Bell, into four groups, as regards their geological distribution within the Dominion: *first*, a northern group including the white and black Spruce, Larch, Banksian Pine, Balsam Fir, Aspen, Balsam Poplar, Canoe Birch, Willows and Alder. These cover the vast territory down to the line of the white Pine: *Second*, a central group, occupying the belt of country from the white Pine line to that of the Plane-Tree or Button-Wood: *Third*, a southern group, embracing the Plane-Tree, black Walnut, Sassafras and flowering dogwood, which are found only in a small area in the southern part of Ontario: *Fourth*, a western group, consisting of the ash leaved Maple, burr Oak, Cottonwood and green Ash, which are scattered sparingly over the prairie and wooded regions west of Red River and Lake Winnipeg.

In the western peninsula of Ontario the forests present a remarkable richness in the number of species to be found growing together. In some localities as many as fifty different kinds may be counted in a single farm lot. A more varied mixture is probably not to be met with in any other part of the continent, or perhaps in the world.

Many of the more important classes of forest trees are common both to the Old and New World, such as the Oak, Ash and Elm, and these resemble each other closely, although in almost every instance, says Browne in his "Sylva Americana," the resemblance stops short of complete exactness. In many cases there are varieties in which the difference is so slight as to be only perceptible to the botanist, and yet they are differences which a careful examination plainly shows, and the varying qualities may materially affect the purpose or use to which the wood is to be applied.

Where the exact line is to be drawn distinguishing a tree from a shrub is a question more appropriately in the province of a botanical work than in a plain descriptive treatise, and there are several species attaining the proportions of trees in one part of the country which in another are mere shrubs.

The following description is made as concise as is practicable, giving the scientific and ordinary names of all our trees. The wood each tree produces is also described, together with the purposes to which it is applied.

The order in which the forest trees are here given follows the arrangement adopted in the United States "Official Catalogue of Forest Trees of North America" by Professor Sargent of Harvard College, published by the Department of the Interior at Washington in 1880.

Tulip Tree, Yellow Poplar, or White wood (*Liriodendron Tulipifera*), a tree by no means common, and annually becoming scarcer, attains a large size, reaching a height of from fifty to seventy feet, with a trunk from three to five feet in diameter. When young the bark is light brown and smooth, whilst on old trees it is deeply furrowed by longitudinal fissures, giving it almost the appearance of a fluted column. It presents a beautiful appearance when covered with its large tulip shaped flowers after the middle of June. Its wood is very valuable, being light, close-grained, strong and easily worked; it is extensively used for interior work, carriage panels and the finer fittings of cabinet work, such as drawers and fancy boxes. Being easily bent it is in demand for curved work of all kinds. This tree seems to be confined, with the exception of a straggler here and there to that portion of Ontario bordering on Lake Erie and the Niagara district.

Basswood, Linden or American Lime (*Tilia Americana*), resembles the Maple in growth, but the trunk is more pillar-like, and free from the knots which characterize the latter. It attains a considerable size, reaching from sixty to eighty feet in height, with a trunk of from three to four feet in diameter. Its leaves are smooth and large, rendering it a fine shade tree for pastures, as the denseness of its foliage resists the great heats of summer. Its wood is white, light, tough and durable, soft and easily worked, and is used for carriage panels, seats of chairs, fanning mills, sleighs, and for sounding boards for pianos, being a wood that will not warp. It is largely employed in inside work, and is sought after by carvers for toys and for the figure heads of ships, and for the curved

parts of staircases. It is used in turning for wooden bowls and woodenware generally, for band boxes, and for a variety of minor articles where strength and lightness are requisite. A coarse paper is made from its shavings which are first reduced to pulp, and the inner bark is manufactured into bast, an article described amongst the minor products of the forest.

The Maple, (*Acer*) whose leaf is the emblem of Canada, as the rose is of England, contains several species, but a similarity pervades all, so that the description applies to them collectively. It is a lofty tree, with branches nearly at right angles, bent and contorted in every direction. It grows on the best of land, and is always indicative of a rich soil. Its foliage is particularly luxuriant, and when touched by the frosts of autumn is remarkable for its brilliancy of colouring. The wood of the Maple is very close-grained and hard, highly ornamental and esteemed for the beauty of its fibre; when polished it possesses a silky lustre. Strong and heavy, it lacks durability, and from its early decay when exposed to moisture it is not sought after in civil or naval architecture. It is used for heavy furniture, cabinet work and for railway carriages where strength is required. A peculiar arrangement of fibre in some specimens, in concentric circles, resembling the eye of a bird, has given the name "birds eye" to such varieties, which make handsome articles of furniture and picture frames, and command a high price. From the sap of several varieties of this tree is manufactured "maple sugar" and syrup, described elsewhere. Maple when obtainable is universally preferred for fuel, from the great heat it throws out. The White Maple (*Acer Dasycarpum*), is a large tree from sixty to eighty feet high, with a trunk five to six feet in diameter, common in the east, with wood of little value, soft and white. The Striped Maple (*A. Pennsylvanicum,*) not abundant, seldom attains more than thirty feet in height, with small trunk; wood white, close-grained and very hard. The Red Swamp or Soft Maple (*A. Rubrum*), is a large tree generally in swampy and low grounds, wood whitish or rose-coloured, close-grained, moderately hard, and susceptible of a fine polish; largely used in cabinet-making, for turning and for woodenware. The Sugar or Rock Maple (*A. Saccharinum*), grows from sixty to eighty feet high, with a trunk two to four feet in diameter, and thrives in uplands, or rocky ridges; its wood is hard, close-grained, smooth or compact, and is extensively used for flooring, cabinet work, turning, and preference is given to it for shoe-lasts. Sugar is largely obtained from this species. The Mountain Maple (*A. Spicatum*), a northern species, cited by Professor Macoun, is but little known. The Vine Maple (*A. Circinatum*), of the Pacific coast, a tree thirty to forty feet high, or at times only a shrub forming dense thickets along streams, whose vine-like stems, take root wherever they touch the ground, affords a white, close-grained, tough wood, used in the absence of ash for tool handles. Dr. Dawson says this tree is never found inland. Another Pacific coast Maple (*A. Glabrum*), is mentioned by Professor Macoun, but is apparently little known. *A. Macrophyllum* of British Columbia attains

a height of from sixty to eighty feet, with occasionally a diameter of four feet, and like the previous one is confined to the coast; its wood is valuable, hard, close-grained and takes a good polish; is well-adapted for cabinet-making, and is a good substitute for the hickory of the east; hats, mats and baskets are made from its inner bark. The Ash-leaved Maple (*Negundo Aceroides*), is abundant in the North-West, but rarer in the eastern Provinces. It is a tree from thirty to fifty feet high, with a trunk of some two feet in diameter, found along river banks and in rich soil. Its wood is soft and of little value, but the tree is destined from its rapid and easy growth to be the shade tree of the prairie farms.

The Coffee Tree (*Gymnocladus Canadensis*), so scarce in Canada that it cannot be styled as a tree contributing to man's use, attains a height of from 60 to 80 feet with a trunk in proportion. Its wood is rose coloured, close-grained and compact, but said to be difficult to season and work. So scarce is this tree in Canada now, that in Macoun's Catalogue the location of the only known trees existing are given.

The Cherry Tree (*Prunus*).—There are two species of this tree, the Red or Wild Cherry (*Prunus Pennsylvanica*), a small tree from 20 to 30 feet high, of no comparative value. It delights in sandy soil and in Eastern Canada takes possession where the forests have been cleared by fire; its fruit is very small, sour, and astringent. The Black Cherry (*Prunus serotina*), is a fine tree, attaining a height of 60 or 80 feet, with a trunk often 4 feet in diameter. The bark is used medicinally, and its fruit of a purplish black colour is used for the same purpose, being made into a cordial. Its wood is light red, becoming darker with age, close-grained, compact, easily worked and not liable to warp. It is largely used in cabinet-making, for which purpose it is one of the most valuable of our woods.

The Mountain Ash (*Pirus Americana*), is a small tree favouring swampy groves and moist woods, and is of no commercial value. It forms an ornamental tree when planted out and cared for.

The Crab Apple (*Pirus coronaria*), is a small tree with small yellowish green sour fruit, and yields a very hard, yellow, close-grained wood, useful in machinery. The Oregon Crab Apple (*P. Rivularis*), found on the Pacific coast, is a small tree with a very hard wood, susceptible of a high polish. It is especially valuable in those parts of mill machinery intended to stand great wear.

The Service Tree (*Amelanchier Canadensis*), more properly a shrub, runs into a tree in the west. The wood is exceedingly hard, heavy and strong. The Pacific coast species, *A. alnifolia*, is very similar, and its wood is used for rollers and teeth of wheels in machinery.

Dogwood (*Cornus Florida*), is a small tree seldom attaining thirty feet in height; its bark is used as a tonic and astringent, and its wood is hard, heavy, fine-grained and easily polished. The Dogwood of the Pacific coast, *C. Nuttallii*, attains a greater size than the preceding, and its wood is used similarly to Boxwood for carving and engraving.

THE ARBUTUS (*Arbutus Menzesii*), belongs peculiarly to the Pacific coast, occurring on Vancouver and the neighbouring islands, but never far from the sea. It is a very handsome evergreen, but is tender, and is very quickly affected by severe weather. It varies in size from a medium sized tree of fifty feet, with a trunk eighteen inches to two feet in diameter, to a shrub according to locality. The wood is white, close-grained, heavy, and very nearly resembles Boxwood, and is used for the same purposes as the latter, which, together with its scarcity, makes it valuable.

THE ASH (*Fraxinus*) is an elegant tree in growth, its branches diverging from the stem like the branches of a chandelier, diminishing in length with great regularity as they proceed upwards. The twigs end very abruptly. There are several species of the Ash in Canada, and the wood differs, more from difference of soil and situation, than that of any other tree. It is highly esteemed for its strength, suppleness and elasticity, and is used for cabinet work, farm implements, oars, barrel staves and hoops, and is employed in carriage building and in the manufacture of sleighs. Narrow strips of it are largely used in basket-making. The White Ash, (*Fraxinus Americana*), is a tree of from sixty to eighty feet in height, with a trunk from four to six feet in diameter, its wood is light, tough and very strong.

THE RED ASH (*F. Pubescens*), is a medium-sized tree found on the border of swamps and in low ground. Its wood is of less value than the other species. Black Ash (*F. Sambucifolia*), is a small or medium-sized tree found on the border of swamps and along low river banks. Its wood is of a brownish colour, tough and elastic, and easily separable into thin layers. Blue Ash (*F. Quadrangulata*), is a large tree sixty to eighty feet high, with a trunk in proportion, and its wood equal to that of the White Ash. Green Ash (*F. viridis*), is a small tree growing along streams or in low grounds; its wood is tough and very elastic.

SASSAFRAS (*Sassafras Officinale*), is a small-sized tree with a white or reddish wood, according to the soil in which it grows, light, very durable, and slightly aromatic, but very little used. The roots, and especially their bark, enter largely into commerce, and afford a powerful aromatic stimulant. The oil of sassafras distilled from the roots is largely employed

THE ELM (*Ulmus*), when growing in the open clearing with a full supply of light and air, is one of the handsomest Canadian trees. The main trunk dividing into several leading branches, which continue to grow upward, dividing and sub-dividing into long flexible, pendulous branches, which again bend and float lightly in the air, give to this tree a broad and somewhat flattened top of regular proportion and great beauty. When growing in the forest, it is one of the most lofty trees, with a remarkably straight, round trunk, without a branch till near the top, which is small for the height of the tree. The elm prefers low, humid, and heavy soil along the banks of rivers, or borders of swamps. Its wood has less strength than the oak, and less elasticity than the ash, but it is tougher and less likely to split, bearing the driving of bolts and nails better than any other timber. It is used for the gunwales and blocks of ships, for the

carriages of cannon, and by wheelwrights for waggon making, being especially useful for the hubs of wheels. As timber, its boards are not much used, but they are very serviceable about mills, waterways, or for any purpose beneath the water line. The various species are the White or Swamp Elm, (*Ulmus Americana*), from 60 to 80 feet high, with a trunk 6 to 8 feet in diameter, flourishing in deep moist soil; its wood is brown, strong, very tough and resists the wedge. Red or Slippery Elm (*Ulmus fulva*) is a small or medium sized tree, along streams and in damp places. Its wood is reddish, hard, heavy and very tough, and very durable. The inner bark is mucilaginous, and is employed in various medicinal preparations.

Rock Elm (*Ulmus racemosa*), is a large tree possessing wood of a fine grain, compact, flexible, heavy, strong and susceptible of a beautiful polish; it is largely used in the manufacture of agricultural implements, heavy furniture, and for all purposes combining strength, toughness and solidity.

Hackberry or False Elm (*Celtis occidentalis*), a small tree closely resembling the elm is not common, being met with only occasionally and at rare intervals. Its wood is white, soft and probably of little value.

Plane or Buttonwood (*Platanus occidentalis*) is found chiefly along the shores of Lakes Erie and Ontario, and occasionally here and there elsewhere. It attains a great size, reaching in rich soil a height of 80 feet and upwards, with trunk 8 to 10 feet in diameter. Its wood is reddish, close grained, unwedgable, not durable when exposed to the weather and liable to warp. It is but little used. It is frequently mistaken for one of the maples.

The Butternut (*Juglans Cinerea*), from the similarity of its foliage with the white ash, is often confounded with that tree. It is of very elegant growth, small or medium sized, and appears to the best advantage in pastures and on the sides of roads or along fences. The nuts it bears are eagerly sought after, and the kernels being very oily were in former times pounded by the Indians and boiled; this operation separated the oily substance which rose to the surface and was used by them as we use butter, hence its name. Its wood is light, of little strength and of a brownish hue, soft, easily worked, durable, and takes a good polish; it possesses the advantage of being able to resist the effects of heat and moisture, and is secure from the ravages of worms. It enters largely into the manufacture of furniture and cabinet making, and when stained has all the appearance of black walnut. For wainscotting and fitting up libraries or churches it is well adapted, being easily worked, of a pleasant color, the grain being well thrown out when polished, and showing to good advantage.

Black Walnut (*Juglans Nigra*) is a very graceful tree. It is becoming scarce compared to what it was a few years ago. The section of country where it is still to be found is in the peninsula between Lakes Erie and Huron, but it is even there becoming an object of rarity. It attains a vast size from 70 to 90 feet high with a trunk 4 to 6 feet in diameter, and

the walnut groves being free from underbrush afford a pleasant contrast to the generality of bush scenery. Its wood is light, soft, easily worked and very durable, close grained and highly ornamental, is of a dark brown hue and unequalled for beanty on the American continent. It is largely in demand for cabinet work, furniture, and the finer branches of the joiner's art. From its scarcity it commands a high price.

The Hickory (*Carya*), is a tree of stiff growth and appearance, attaining a considerable size, and from its peculiar features gives at once an idea of solidity. It attains a considerable size, and is generally found growing in clumps or groves, free from undergrowth. Its wood is heavy, strong, tenacious, and elastic, and furnishes the best and most valuable firewood of any of our trees. It is largely used for implements of husbandry, carriages, and from its toughness, pliability, and elasticity, is in demand for fishing-rods, axe-handles, &c. The nuts it produces are highly esteemed. There are several species of this tree. The Shell-bark (*Carya alba*), is a tree from 50 to 70 feet in height, with a trunk 2 to 5 feet in diameter, preferring dry upland soil. Its wood is very heavy, strong, and tenacious. The Butternut, or Swamp Hickory (*Carya Amara*), is a small or medium-sized tree, generally found in low grounds; the nut is thin shelled, exceedingly bitter, and not eatable. Its wood has the general characteristics of the family, but is lighter, and in every way less valuable. The Pignut (*Carya porcina*), sometimes called Brown Hickory, is a medium-sized tree, preferring a dry soil. Its wood is very similar to that of the Shell-bark. The White-heart Hickory (*Carya tomentosa*), also prefers dry rocky or stony land, and is occasionally found along the gravelly banks of streams. Its wood is much the same as all the other hickories.

The Oak (*Quercus*), of Canada is inferior in the quality of its timber to the British oak, but its wood is of great strength, weight, and durability. It is far less lofty than the pine, and has no pretensions to the beauty of the elm, but as an emblem of robust vigour, it stands at the head of all the trees of the forest. Its wood is in great request for agricultural implements, boat and shipbuilding, carriages, sleighs, and for cooperage purposes; also for railway ties, posts, piles, and for fuel. The White Oak (*Quercus alba*), is a large tree, 60 to 80 feet in height, and being of the very first economic value, and superior to all other oaks in the quality and value of its wood, ranks high. This species has the peculiarity of tenaciously holding on its dried leaves during the winter season. Its wood is light-coloured, strong, elastic, heavy, and durable; is largely employed in cooperage. The Swamp White Oak (*Quercus bicolor*), is a large tree with great circumference of trunk, and delights in swampy land and to grow along streams. Its wood is said to be equal to white oak. The Scarlet Oak (*Quercus coccinea*), a middle-sized tree, prefers light sandy soil Garry's Oak (*Quercus Garryana*), found on the Pacific coast, though not abundant, is a tree of from 70 to 100 feet high, and extends further north than any other oak of the Pacific coast. Its wood is hard, brittle, and is used for flooring and other purposes in building, and for cooperage. The

Burr or Mossy Cup Oak (*Quercus macrocarpa*), is a large tree of from 60 to 80 feet high, with large trunk, and is not very abundant in the east. Its wood is of little value except for fuel. The Pin Oak (*Quercus palustris*), is a medium-sized tree, growing in low grounds, with coarse-grained wood, strong, but not durable. The Chestnut Oak (*Quercus Prinus*), is a large tree, with a reddish, porous wood, strong, and used in buildings but inferior to white oak. The Red Oak (*Quercus cubra*), is a large tree, common in all rich woodlands, whose wood varies with localities, and used generally for building and cooperage. The Black Oak (*Quercus tinctoria*), a large tree from 80 to 100 feet high, is very common. Its wood is close-grained, strong, durable, and largely in demand. The bark is rich in tannin, and the inner bark yields a valuable yellow dye.

The Chestnut (*Castanea vulgaris*), met with along the shores of Lakes Erie and Ontario, is a very handsome tree, but seldom attains the full growth it reaches in a more southerly climate, and the fruit or nuts it bears are smaller than those grown in the South, which, in their turn are smaller than the fruit of the European tree. Its wood is light-coloured, coarse-grained, moderately strong, very durable, but difficult to season and liable to warp; it is largely employed in cabinet-making, and for railway ties, posts, &c.

The Beech (*Fagus ferruginea*), has a straight trunk and smooth bark, with larger and straighter branches than the maple, and which come to a finer point. When crowded in the forest its stem rises pillar-like even to 80 feet in undiminished thickness before branching into a tufty crown. Standing apart, it sends forth branches at from 10 to 30 feet above the root far and wide. It prefers deep soil of good quality. Its wood is light-coloured or reddish, close-grained, compact, heavy, and takes a good polish; it is incorruptible if kept under water, but decays rapidly when exposed to the alternations of dryness and moisture. It is principally used for agricultural implements, tool handles, shoe lasts, planes, mallets, and for turning, and occasionally in fitting up ships' cabins and railway carriages; it is largely used for firewood. The beech produces every alternate year a large yield of nuts, on which hogs fatten rapidly, and which afford sustenance to various kinds of game. This tree is so rarely struck by lightning that woodmen and Indians feel comparatively safe under its shelter. Good oil can be pressed from the nuts or mast almost equal to olive oil after purification.

Ironwood (*Ostrya Virginica*), is a small tree rarely exceeding 40 feet in height, with a trunk of about one foot in diameter. Its wood is white, compact, fine-grained, very heavy, durable, and is used principally for mallets and other articles where weight and toughness are required.

Hornbeam or Blue Beech (*Carpinus Caroliniana*), is met with abundantly in the older Provinces, where it is frequently confounded with Ironwood, being also called by that name. It attains its greatest size in Western Ontario, where it reaches a height of thirty or forty feet, with a trunk of two feet in diameter. When it has space to grow and is not crowded in

the forest, it is a low-sized tree with a broad, round leafy head, its lower branches bending nearly to the ground. Its bark is of a slatey or blueish hue, hence one of its names, "Blue Beech." Its wood is exceedingly hard and tough, resisting all attempts at manufacture, and is only used for mallets, rollers and levers, and being both tough and elastic, oxen yokes are made from it.

Birch (*Betula*), thrives in any sterile soil, and is a very graceful tree. Its wood is fine, close-grained, white, moderately hard, of considerable strength, and takes a brilliant polish. It is largely used in shipbuilding for the keel, lower timbers and planks of vessels, and as it is almost indestructible under water is will adapted for piles, foundation timbers, sluices and similar works. It is also used in cabinet work and for agricultural implements. There are several species as follow: The White Birch (*Betula alba*), a small tree growing in dry or gravelly soil with white, hard wood, extensively used in making spools; Black or Cherry Birch (*B. Lenta*), a medium-sized tree, preferring rich woodlands, with reddish wood, good for cabinet work; Yellow or Gray Birch (*B. Lutea*), one of the largest of hardwood trees, reaching up to eighty feet, with a trunk three to four feet in diameter; its wood resembles but surpasses that of the Black Birch, and is excellent for fuel as producing great heat; Paper or Canoe Birch (*B. Papyracea*), a large tree which extends to a higher latitude than any other deciduous tree; its wood is white and compact and is used for spools, shoe lasts, &c. The bark being very tough and durable, separates easily in large thin layers, and is used for making canoes and a variety of Indian wares. Western Birch (*B. occidentalis*) of the Pacific slope and found also in the North-West, is reported as abundant, and largely used by settlers for fencing and for general purposes.

The Alder (*Alnus*), never attains any great size in the East, but is nevertheless a useful tree. The Speckled or Black Alder (*Alnus Incana*), found along streams and in swamps, furnishes a heavy hardwood used for foundry patterns, for the manufacture of charcoal, and for the final baking of bricks. The Red Alder (*Alnus Rubra*) attains the dimensions of a small tree on Vancouver and the neighbouring islands, and on the coast of the mainland of British Columbia, sometimes attaining two feet in diameter. The wood is easily worked, is well adapted for turning, and takes a good polish. It is used for the better quality of furniture, and is sent to Oregon for manufacture there.

The Willow (*Salix*), grows abundantly and is a graceful tree, not only from being one of the first to assume a green tinge in spring, but also from the fact of its retaining its foliage far into the autumn. Its wood is used by wheelwrights and for sundry articles of household use, where elasticity and firmness are required. Its young shoots when properly treated are used for baskets, but there is abundant scope for a large and profitable business to be done in the cultivation of osiers as in Europe. The Common or Swamp Willow (*S. Cordata*), seldom attaining any size, grows along streams and in wet ground. *S. Lasiandra* is a British

Columbia species, much like the previous one. *S. Lucida* is common through Canada and is more of a shrub than a tree. *S. Nigra*, the Black Willow, is the largest in growth, often attaining thirty to forty feet in height, and the trunk, when the tree has been subject to pollarding, attains a great thickness. It is a universal tree.

Poplar (*Populus*), of which several species abound, is the most widely diffused tree of North America, but is most abundant all through and over the West and North-West. Its wood is of no great value except for ornamental purposes, although it is occasionally used in the manufacture of carriages and sleighs, and as charcoal for smelting purposes. Spools and bobbins are made from it, an industry that is growing, and paper is now being made from Poplar wood shavings reduced to pulp, an industry that bids fair ere long to assume large proportions. The Poplar is one of the principal trees in the North-West. The Narrow-leaved Poplar (*P. Angustifolia*) of the Pacific coast is a medium-sized tree, not much known, its wood being of little value. The Balsam Poplar, or Balm of Gilead, (*P. Balsamifera*) is well known from its aromatic smell in spring when the buds are opening, the odour being especially perceptible in the evening, or before and after rain. It is a large tree, but its wood is very brittle and of little use. The large toothed Poplar (*P. Grandidentata*) is a medium-sized tree from seventy to eighty feet high, with a trunk sometimes two feet in diameter. Its wood is white, soft and very light, and is largely ground into pulp for paper. The Cottonwood (*P. Monilifera*) is a very large tree from 80 to 100 feet high, and with a trunk from four to eight feet in diameter. Abundant in the North-West and in British Columbia. It is a handsome tree, and throws up from its roots numerous suckers which form quite an undergrowth around it. When its flowers are over, their stems are covered with a filmy down not unlike cotton, whence its name. Dr. Dawson mentions a species of this Poplar (*P. Trihocarpa*), growing in open spaces along streams and in river bottoms in British Columbia which reaches a height of from sixty to one hundred feet, the wood of which is largely employed at some places on Puget sound in the manufacture of staves for sugar barrels, which are used at San Francisco for the Sandwich Islands crop.

The Aspen (*P. Tremuloides*), the leaves of which are apparently always in motion on the calmest summer day, from the peculiar manner in which they are attached to the bough, is a small tree seldom attaining a height of fifty feet, and with a small trunk. It is one of the most widely distributed of Canadian trees, and prefers moist slopes and bottom lands. It forms a second growth after fires in many parts of the country to the exclusion of everything else. Its wood is white, soft and easily worked, and is used in turning, and also for paper pulp. Its bark possesses a smooth, greenish-white appearance, which comes off readily on being touched like whitewash.

The Yew (*Taxus Brevifolia*) occurs in Vancouver Island and on the shores of the mainland adjacent, attaining sometimes a diameter of 2 feet. It is a very tough, hard wood of a beautiful rose colour, employed

for various ornamental purposes. A shrubby species, *T. Canadensis*, found in the Eastern provinces, never attains any proportions beyond that of a bush.

The Red Cedar (*Juniperus Virginiana*) is becoming very scarce in the older provinces, but is found in an arboreal form with a diameter of one foot in British Columbia. It is known as pencil wood. The wood is red, aromatic, close grained and durable. In Quebec and Ontario it is known as Red wood or Baton rouge, and a fine specimen of it was exhibited at the Paris exhibition of 1867, cut on the Gatineau River.

Yellow Cypress (*Chamæcyparis Nutkæncis*) of British Columbia, confined to the vicinity of the coast and adjacent islands is a large tree, its trunk often exceeding 6 feet in diameter. It is comparatively unknown in commerce. The wood is strong, of a fine grain, rich golden yellow colour, and very durable.

The Western Arbor Vitæ (*Thuya Gigantea*) of British Columbia is a medium sized tree with soft, light coloured, easily worked wood, used for shingles. The fibres of the inner bark are used by the natives for making robes, and from this tree are carved the large posts which ornament the Indian villages of the Queen Charlotte Islands.

The White Cedar (*Thuya Occidentalis*) has a fibrous or stringy bark; it grows in swamps or wet ground, and so densely as to render a "cedar swamp" almost impenetrable. It is rare in Nova Scotia, where Professor Macoun only found it sparingly, and very rare in Prince Edward Island, in fact it is doubtful if it is indigenous there. It attains a considerable size although not a very large diameter. Its wood is light, soft, fine grained and easily wrought. It splits easily, and is largely used for shingles and for fencing Its great value consists in its durability, almost incorruptibility, for it may be exposed to every vicissitude of weather for years without manifesting any symptom of decay. It is in great demand in consequence of this property, for fencing and for railway ties. It enters also largely into the manufacture of pails, tubs, and other domestic articles where lightness is required.

Balsam Fir (*Abies Balsamea*) is one of the most elegant of the pine family; it grows very straight, its branches project at an angle and grow to a length diminishing with great regularity as they approach the top giving the tree the appearance of a slender but very regular cone. Its foliage is dense, and of a greener tint than other firs; its bark is covered with bladders full of a fluid which hardens by long exposure: this is the Canadian Balsam of the apothecary celebrated for medicinal and other purposes. Its wood is light and slightly resinous, but does not make good boards; it is, however, valuable for staves of casks and pails, and the trunk is used for masts and scaffold poles. In British Columbia there occur the Balsam Spruce (*Abies Subalpina*) often exceeding two feet in diameter, but its wood is worthless, and another fir (*Abies grandis* or *amabilis*), growing to a large size, with wood white and soft, but too brittle for most purposes and liable to decay very rapidly.

THE DOUGLAS FIR, Spruce, or Oregon Pine (*Pseudotsuga Douglassi*) is the most important timber tree of British Columbia, and the only one of which the wood has as yet become an article of export on a large scale. It reaches a height of from 200 to 300 feet, forming prodigious and dark forests, and frequently exceeds 8 feet in diameter. Its wood is yellow or reddish, coarse-grained, heavy and strong and is unsurpassed for strength, length and straightness for spars and masts. The best grown trees are those near the coast.

HEMLOCK (*Tsuga Canadensis*) is a tree of majestic growth, and its appearance when young is quite different from that of an old tree, as it possesses a feathery lightness, graceful, and bending to the slightest breeze; but when old it becomes sturdy, with rough bark and deeply furrowed, is full of gnarled and broken limbs, the top generally blighted and dead, and the foliage deprived, to a great extent, of the pensile grace which gives the charm to its youthful growth. Its wood is light coloured, coarse and crooked grained, and very liable to splinter. It is largely sawn into boards of an inferior quality, but well adapted for mining purposes, wharves, flooring of barns and other purposes in farm buildings. It gives a tight hold to nails, and as inch boards is in common use for the first covering of frame houses. It is said that iron, when driven into it, will not corrode, either in or out of water. Split laths are also largely manufactured from this wood. The bark is largely used for tanning purposes, and for making an extract for tanning, the manufacture of which is quite an industry in the Province of Quebec. The Western Hemlock (*Tsuga Mertensiana*), abundant on the Pacific Coast, reaches a height of 200 feet, and yields a good wood, not yet, however, much used.

WHITE SPRUCE (*Picea Alba*), a small tree of from thirty to forty feet in height, with a trunk from eighteen inches to two feet in diameter. Its wood is of an inferior quality, light coloured, and used more for masts of boats and small spars than for any other purpose. Black Spruce (*Picea Nigra*) is abundant; it attains a height of from ninety to one hundred feet, with a trunk two to three feet in diameter. Its bark when young is brownish, and always covered with small scales. Its wood is light coloured or reddish, light, elastic, strong, and is largely sawn into boards and square timber. The spruce timber of the eastern markets is derived from this tree, known as spruce deals or battens, which contribute a valuable export. The tree furnishes excellent yards and topmasts for ships. Engelmanns, or the Western Black Spruce (*T. Engelmanni*) of the Pacific Coast, closely resembles the former, and affords excellent and durable wood. The trees run up tall, straight, and attain a great height. Menzies, or White Spruce of the Pacific (*P. Sitchensis*), is very similar, and attains a great size. Its wood is light coloured, straight grained and valuable, and quite equal, if not surpassing, that of the Black Spruce of the east.

THE LARCH or TAMARAC (*Larix Americana*), the only deciduous tree of the pine family, shedding its leaves in October and resuming them again in May, is a magnificent tree, with a straight, slender trunk eighty feet

or more in height, and upwards of two feet in diameter. It is found in most uplands and intervales, and in cold, wet swamps. Its wood unites all the properties of the European larch, is light coloured, strong, durable, close grained and hard when seasoned. It is used for ships' knees, for posts, railway ties, and is excellent for ship planks and ship timber; it is used also in the more trivial purposes of house building. It is well adapted for door and window frames, as it does not shrink or warp. Joists and rafters made of it support an almost incredible weight, for it is exceedingly strong, and under water it lasts for centuries. Shingles made of it are more durable than those of pine or cedar. The Western Larch (*L. Occidentalis*) of British Columbia, said to attain a height of 150 feet, with a trunk two to three feet in diameter, yields a strong, durable timber, but coarse. Lyall's Larch (*L. Lyallii*), of the same locality, is but little known.

Scrub or Gray Pine (*Pinus Banksiana*) extends further north than any other species, and varies from a scrubby growth in extreme northern latitudes to a tree of sixty, and in British Columbia one hundred, feet in height. Its leaves or needles are only two to the sheath, as in all the other pines except one, the White Pine. Its wood is hard, resinous, and its chief use is for railway ties. The Western Scrub, or Bull Pine (*P. Contorta*), covers large areas in British Columbia. It is found also in the North-West. Its wood is white and fairly durable, but seldom used on account of its small size. The inner bark contains sugar, which is used by the Indians.

The Western White Pine (*P. Monticola* or *Flexilis?*) of British Columbia closely resembles the Eastern White Pine, but seldom attains more than sixty to eighty feet in height, with a trunk of two to three feet. Its wood is soft and white, and, though not equal to its eastern namesake, is fast coming into use. The seeds of it are used as food by the Indians.

Western Yellow Pine (*P. Ponderosa*) attains a height of from 100 to 150 feet, and, with a head of considerable size, forms a remarkably handsome tree. Its wood is yellow, hard, heavy, strong, durable and very valuable when not exposed to the weather. It prefers mountain ranges, and often grows in the most arid situations in British Columbia.

Red or Norway Pine (*P. Resinosa*) reaches a height of from sixty to eighty feet, with a trunk of from two to three feet in diameter. It seldom forms forests, but is found scattered amongst other trees. Its leaves have a crowded appearance at the ends of the branches. Its wood is light coloured, resinous, hard, heavy, durable, and is employed in construction and ship-building.

White Pine (*P. Strobus*), in a commercial point of view, takes the pre-eminence of all the pine family. This tree is easily distinguishable from all the others by the lightness and delicacy of its foliage, and by being five-leaved—*i.e.*, putting forth its needles in sheaths each containing five. All evergreens except the pine are without a sheath for the leaves or needles. This tree attains a height of from 120 to 150 feet, with a trunk, however, rarely exceeding four feet in diameter. The trunk is singularly

smooth and straight. The most magnificent specimens are found in the depths of our forests, in a virgin soil covered with the accumulated mould of centuries. Its wood is soft, light, free from knots, and is easily worked; is in great demand for inside work from the ready manner in which it takes paint; it is durable, and not liable to split when exposed to the sun. It furnishes timber of large dimensions and boards of great width, and is employed in far more diversified uses than the wood of any other tree in America. It is rapidly becoming scarce, as far as its trees of any size are concerned, owing to the great demand for it, and the search after it has carried lumbering operations further into the back country than the search for any other timber would ever have occasioned. Mr. Little, of Montreal, one of the best authorities on Canadian timber, said at the Cincinnati Forestry meeting of 1882 that the remark once made that "our native white pine may yet be peddled in some parts of our country as a rare exotic, so scarce has it become," is certain to be realized in the future.

LIST OF WOODS AND USES.

The following lists enumerate the purposes to which various woods are applied:

BUILDING—Cedar, pine, spruce, fir, larch, elm, oak, birch for ship-building; pine, oak, white wood, ash, spruce, chestnut and birch for house carpentry; hemlock for barns and outbuildings; hemlock, elm, beech, birch, oak, plane, alder, white cedar for wharves, docks, flumes, mines and wet foundations and for piles.

MACHINERY—Ash, beech, birch, pine, elm and oak for frames; alder and pine for foundry patterns; service tree for rollers; crab apple for mill machinery; hornbeam, ironwood and service tree for teeth of wheels.

FURNITURE and CABINET WORK—Beech, birch, cedar, cherry, pine, white wood, ash for common use; maple, oak, butternut, walnut, cherry, chestnut, cedar, tulip wood and alder for best furniture.

COOPERAGE—Fir, cedar, oak, ash, poplar.

AGRICULTURAL IMPLEMENTS and WHEELWRIGHTS—Beech, elm, oak, hickory, ash, bass, willow; and for tool handles, birch, ash, hickory, beech, hornbeam, ironwood.

RAILWAY TIES—Larch, cedar, oak, ash, hemlock, chestnut and hickory.

CARVING and TURNING—Bass, willow, arbutus, red alder, dogwood.

GENERAL—Birch and poplar for spools and bobbins; poplar and bass for paper making.

PROPERTIES.

ELASTICITY—Ash, hickory, chestnut, and red-birch.

TOUGHNESS—Beech, elm, oak, walnut, hornbeam, ironwood, bass, willow.

GRAIN (for engraving)—Bass, arbutus, and dogwood.

DURABILITY—In dry works, cedar, oak, poplar, pine, chestnut; exposed to weather, larch; and in wet works, white cedar, birch, hemlock, elm, alder, beech, oak, and plane.

MINOR PRODUCTS OF THE FOREST.

POT AND PEARL ASHES.

In the early days of the settlement of Canada, and clearance of land, the greater part of the wood felled was burned on the spot, and from the residue of the fires was manufactured pot and pearl ash. But since wood has become more valuable, as it decreased in quantity, potash works in the forest have been for the most part abandoned, and the business is now confined to factories for its especial manufacture. The last census returns show that in 1881 there were 225 of these factories, employing 467 hands and the value of their product is given at $345,096. In 1883 the exports of pot and pearl ash were 7,801 barrels, valued at $208,055.

HEMLOCK BARK EXTRACT.

The manufacture of this extract for tanning purposes especially in the Eastern Townships of the Province of Quebec where hemlock abounds is assuming large proportions, and it is far better to manufacture the bark into a merchantable article of current value at the place of growth, than to send it bulky as it is in the rough to foreign markets. The census of 1881 enumerates 4 factories, employing 140 hands, and places the value of their products at $286,250. According to the Customs Returns in 1881 the exports of extract amounted to $190,068, in 1882 $234,908, and in 1883 $305,426, whilst of plain bark besides the value of exports was $481.758, $431,562, $321,991, in the three years respectively. To manufacture it the bark is put through a process of leaching and then the principal watery portion is evaporated, so that a concentrated solution of tannin is the result. The wholesale destruction of hemlock trees for the manufacture of extract threatens to seriously diminish the future supply of hemlock, a wood that will become more and more useful as pine disappears. In a report of a Committee of Parliament as far back as 1868 it was estimated that an extent of 10,000 acres of the best hemlock land was stripped every year for the means of supplying with bark the extract factories, the timber being left to rot in the ground.

TURPENTINE.

Turpentine which with pitch and tar constitutes one of the chief products of the pine forests of the Southern States, has never been obtained in any quantity here, though there is no reason why our pine forests should not furnish us with a large quantity annually if proper measures were taken to produce and procure it. During the civil war in the United States the price of turpentine rose to three times its previous

value, and was then even scarcely procurable, showing how necessary it is that there should be more than one source of supply on this continent for so needful an article. Turpentine is procured in the southern forests by cutting and gashing the bark of the tree in the early spring, when twice a week or oftener the trees thus treated are visited and scraped with a blunt hoe which gathers into a receiving vessel the sap which has exuded as turpéntine.

BAST MATTING.

The inner bark of the basswood tree is of as much importance as the wood, from the use to which it is put. It is composed of long tough cells which have given the name of "bast" to the tissue in whatever plant it may occur. Hitherto the great supply has come from Russia in the shape of matting largely used for packing furniture, being a coarsely woven fabric of twisted strands of the inner bark of the linden. This matting is an important accessory to gardening, as strips from it are in great demand for tying up plants and young trees. Bast from the American linden or basswood is now sold, and if properly selected is quite as good as the foreign article. It is obtained from young trees, which are stripped whenever they peel freely, and thrown into water; after a few days steeping, the layers of the bark will readily separate, when they are pulled apart and hung up to dry; the inner most layers are too delicate and tender, whilst the outer ones are tough and vary in quality; the layers are consequently assorted for different uses. This is an industry which will bear increasing in Canada, when it becomes known from statistics that 14,000,000 bast-mats of from 1½ to 2 yards square are annually imported into England alone, principally from Russia.

MAPLE SUGAR.

Maple sugar is manufactured from the sap of the tree known by the several names of rock maple, sugar maple and hard maple. The season for making it commences in March or early in April, and seldom lasts more than four weeks. The sudden transition of the temperature from winter to spring is essential to its production, for in the latter season only does the vital principle of the tree pass in large quantities from the roots to the branches. It is while making this passage that the sap has to be obtained, which is accomplished by making an incision in the tree some three feet from the ground, and receiving the liquid in a vessel prepared for the purpose. The general method is to bore a hole with an auger in the trunk about an inch deep. Some cut an oblique notch with an axe, but this wounds the tree unnecessarily, and causes premature decay. Beneath the hole or notch a semi-circular incision is made with a large iron gouge called a tapping iron, into which a spout made of a piece of wood, guttered down the centre, is driven to catch the sap as it flows from the hole above, and conduct it to the vessel beneath. These receiving vessels are generally troughs, rudely cut out of a log of ash or other soft wood; but a much handier way of catching the sap is by

driving a nail into the tree just below the spout, on which is hung the bucket by a hole in one of the staves. The advantage of this method is that a much shorter spout serves, and the sap cannot be overturned by hogs or stray cattle, as frequently happens when it is left standing on the ground. When a frosty night is followed by a warm, bright, sunny day the sap flows abundantly, at which time three or four gallons are obtained from a single tree in twenty-four hours. It seldom runs at night. A young tree, provided it has obtained a growth of about a foot in diameter, yields better than an old one, and one growing on a clearing that has been raised there, better than a forest tree. It takes ten gallons of sap to make one pound of grained sugar. Of the sugar produced there are two kinds—viz., the hard or cake sugar, and that of a friable nature, which is produced by constantly stirring the thick syrup when it is becoming cool after boiling.

From the very nature of the business, the making of maple sugar is carried on commonly in an encampment where trees are plentiful. From 200 to 300 trees are as many as can be conveniently attended to at one boiling place or camp. When little or no snow lies on the ground more business can be done than in deep snow, owing to the greater facility of carrying the sap to the camp, but generally from the shelter of the forest, the snow continues unmelted there much later than in the fields or roads. As soon as the trees have been tapped and the juice begins to run into the wooden vessels beneath, the men of the party build the necessary fires and suspend over them every variety of pots, pans, and kettles, and from one end of the camp to another is presented an animated and romantic scene, which continues without intermission day and night. As has been before mentioned, the sugar is dependent upon the weather; but even when it is prolonged to four weeks, it continues from beginning to end to be one of hilarity and gladness. When the men are not engaged in carrying the sap or boiling, they are busy felling trees and cutting and splitting them up for firewood, to be used in boiling down, as this process consumes a large quantity of fuel. For this purpose they select those hardwood trees that stand near the camp, such as superannuated maples, beeches, birch, and other trees. The boiling kettles are suspended over the fire on a strong stick, laid across two forked poles, which are stuck into the ground. In some parts of the process it is necessary to stop the boiling very suddenly, and this is done by throwing a shovelful of snow on the fire. As the watery part of the juice evaporates by boiling, repeated fillings up are added; and a piece of fat pork thrown in has the effect of refining it, and causing all extraneous matters to rise in a thick coat of scum. When it has boiled to a consistence of about that of oil it is baled out into a cask, and is then called syrup or molasses. The first boiling is then complete, and the same process is repeated until a sufficient quantity is collected to "sugar off," as it is called, that is to complete the process of boiling the syrup over again till it will crystalize or granulate. This is a delicate operation and requires considerable attention. The kettles are filled with syrup; as this wastes away they are refilled

and kept constantly skimmed; it is now requisite to keep a regular fire and watch the sugar attentively, to stop the boiling at the right instant, as a minutes' delay may greatly injure it in colour and flavor. When about half done it is called maple honey, from its resemblance to honey in taste, appearance, and consistence. The time to remove it from the fire is known by a very simple and infallible test. A twig is taken, and the ends of it bent into a hoop or circle about an inch wide; this is dipped into the kettle and on taking it out, a film of sugar is stretched across the bow, which must be gently blown on with the breath; if it break through it is not done, but if the film be sufficiently glutinous to be blown into a bubble, it is ready to granulate, and the fire is instantly put out. It is then baled out, and if soft sugar is to be made, it is poured, when somewhat cooled, into wooden vessels, the bottoms of which are bored with small holes; the surface and sides soon become hard, having crystallized first; this crust is repeatedly broken and the whole stirred together: the molasses gradually drains through the bottom, and the sugar is left exactly resembling cane sugar. But it is more usual to let the sugar cool in vessels without either disturbing it or draining off the molasses, so that it becomes a mass nearly as hard as a rock and very dark in color. The average yield of each tree is from two to three pounds in a favorable season; 2,000 lbs. weight will sometimes be made by one farmer in a spring, worth from 10 to 12½ cents per lb.

The sugar-making labours are usually wound up with a sugar bee or party, to which every one in the neighbourhood is invited; a sumptuous and miscellaneous feast is spread, and dancing is carried on to the music of a fiddle.

The principal places for sugar-making are the province of Quebec, especially that part of it called the Eastern Townships—Nova Scotia, and some parts of New Brunswick, bordering on Maine; not so much is made in Ontario, except in that part lying north of Lakes Simcoe and Couchiching, where it is largely manufactured by the Indians, and brought into the markets of Toronto, Hamilton, and other western towns, in very neat birchen packages called by them *mocucks*. The Indians gladly barter their sugar for flour, pork, ammunition, blankets, or trinkets, and it thus forms about the only lucrative branch of the products of the forests which the native owners of the soil gain from communication with civilization.

The quantity of maple sugar manufactured in the respective Provinces according to the last census as far as was ascertained, was:

	Lbs.
Prince Edward Island	25,098
Nova Scotia	217,481
New Brunswick	453,124
Quebec	15,687,835
Ontario	4,169,706
Manitoba	2,796
British Columbia	9
Total	20,556,049

Of course a great deal more was made in small quantities of which no record was taken.

The exports of maple sugar as shewn by the Customs returns were:

	Lbs.	Valued at
In 1881	172,285	$14,616
In 1882	277,782	20,864
In 1883	169,662	12,358

Professor Macoun states that sugar is made in the North-West from the sap of the Birch and also from the Ash-leaved Maple.

The inner bark of the *Pinus contorta* of British Columbia contains a sugary substance which, although not manufactured in any way, is used by the natives largely. They pull long strips of it off the trees and dry them for future use, chewing it like tobacco.

SUMACH.

The Sumach, *Rhus Typhina*, is not a tree, but only a shrub, with wood orange coloured, aromatic and brittle. It grows on dry, rocky and gravelly knolls, and in barren spots where nothing else flourishes.

The principal uses of Sumach are for colouring and tanning, the latter more especially for light coloured leather; it is used also in dyeing and calico printing, as it yields with different mordants a great variety of tints. The collection and preparation of the leaves has assumed large proportions in Virginia and the middle States, especially since the close of the civil war. So abundant is the Sumach that there is no need of its cultivation. It is largely imported from Sicily, but there is no reason why our own growth should not be used with the same results, the more so, as the American Sumach contains fifteen to twenty per cent. more tannin than Sicilian.

The necessary buildings, machinery and appurtenances for preparing annually 400 tons, would cost perhaps $10,000. The following directions for gathering will be found to embrace all the essentials necessary:— Sumach should not be gathered before the leaf is properly matured, which is generally about the middle of July, from which time it may be gathered until the first frost. It may be wilted in the sun, but must be cured under cover and not allowed to be burnt by the sun or to get wet or to be placed in such large quantities as to heat in curing, either of which destroys its strength and colour, and renders it worthless. It is better to cure it upon an open floor, in order to let the air pass under it. It should be gathered four weeks before it is ready for market, as not only the leaf must be perfectly dry, but the stem also. All the sap must be dried out perfectly. Never deliver it in damp weather, as it naturally draws the dampness of the atmosphere and cannot be repacked until thoroughly dried out. The leaves must be of the same bright green colour when cured, as when taken from the bush—must not be dark or smell

musty. If any other kind of leaves or sand or dirt are found among it, it will injure it as a commercial commodity. No portion of the stalk or any berries should be left in it. The leaf is what is wanted, but, to facilitate the gathering, the little twigs should be cut off upon which the leaves grow, all of which will be marketable when cured according to the above directions. Stripping off the leaves is apt to kill the stalk, therefore, in order to insure a better crop the next season, it is best to cut down the old stalk, and the roots will spring up better than ever.

PAPER FROM WOOD.

The idea of utilizing wood for the manufacture of paper was first suggested to Reaumer in 1719 from his noticing the fact that the fabric of wasps' nests was formed out of wood reduced to pulp. This industry has of late years acquired great importance, and is rapidly increasing, as the supply of rags on which paper-makers formerly depended for their stock is inadequate to the demand for the manufactured material. Were it not for this factor in paper-making, paper would now be one-half as much more, if not double, the price it is to-day.

The woods most suitable for pulp making are Spruce, Balsam, Poplar and Basswood, the two former being more refractory to reduce than the latter. Birch and Beech are also used, but not to nearly such an extent as the other woods mentioned. There are two processes by which wood fibre is reduced to pulp, the mechanical and the chemical, and for the description of these I am indebted to William Angus, Esq., of Montreal, who is largely interested in pulp manufacture.

The mechanical process consists in grinding the wood which is cut into pieces about twelve inches long by four inches square, and placed in small boxes on a machine where, by means of screws and hydraulic pressure, the wood is kept against the edge of a broad grindstone rapidly revolving. Water is supplied freely to facilitate the grinding and to wash away the pulp into receiving vessels, whence it is taken to be dried and if necessary bleached.

The same work is accomplished also by grinding with emery wheels. After the wood pulp leaves the grinding machine it is manipulated so as to get rid of the coarse fibres of wood or slivers that may be in it. After which it is run over what is called in the trade a "wet machine" into thick sheets, which are then bundled up and shipped to the paper-makers.

Considerable wood pulp in sheets is dried on cylinders as it leaves the wet machine, when it is used as pulp-board for making paper-boxes and band-boxes without any other admixture.

The chemical process requires a large investment of capital and great skill and experience to make a good article, whilst the mechanical process only requires small outlay and but little experience, hence the large number of mills of the latter kind now in operation. The wood is cut into chips diagonally about three-eighths of an inch thick, thus preserving the fibre. These are placed in a boiler with strong caustic liquor, closed

tightly and boiledac ording to the wood used at a pressure of from 90 to 120 lbs. of steam for from eight to twelve hours. When properly cooked the steam is blown off and the boiler emptied into a drainer with a perforated bottom, which allows the liquor to run off into tanks below, after which the pulp is carefully washed to carry off all trace of alkali, and the liquor after being passed through a "recovery furnace" leaves a black soda ash which is as good as new for working again. The paper-maker mixes the wood pulp with rag pulp in a proportion of forty to sixty per cent. according to the standard and quality of papers required.

CHARCOAL.

Charcoal burning is an industry which is local in its character, but yet which finds employment for quite a numerous class. It is largely used for smelting and domestic purposes. The last census returns only enumerate 32 places where this material is made and 83 hands employed therein; but there are large quantities of it prepared of which no record is given in addition. At the St. Maurice forges, at L'Islet, Batiscan, River au Vaches, and Bay St. Paul in the Province of Quebec, large quantities of charcoal are consumed, and at Woodstock, in New Brunswick, and Londonderry in Nova Scotia, charcoal burning is a necessary concomitant of the blast furnaces. In the Geological Survey Reports of 1874, Mr. Harrington states that in Yamaska County alone at the St. Francis furnace, from 1st December to the 1st April, 50 wood cutters and 6 carters were employed cutting and drawing wood to the ovens, and in addition to the foreman 7 men were employed at the kilns and 7 at the furnace, all engaged in charcoal preparation. A cord of dry wood gives from 50 to 60 bushels of charcoal, the wood used being both hard and soft, (one-third of the former and two-thirds of the latter) consisting of maple, birch, hemlock, spruce, beech, pine and balsam. The soft wood loses less in volume by charring than hard wood. The ovens are 50 feet long, 16 wide and 12 high. About 190 bushels of charcoal are required under the most favourable circumstances to make one ton of pig iron, and in spring, when the ore is wet and covered with ice, as much as 400 bushels are sometimes necessary. Professor Hind says that at Woodstock 126 bushels are required to a ton. At Londonderry, Mr. Romans quotes from 135 to 160 bushels to a ton, it being burned there by furnaces in the vicinity, and it costs, delivered at the furnace, seven and a half cents per bushel.

HOP-POLES.

A very large business has of late years sprung up in Central Canada in shipping at various way stations, young cedar trees stripped for the purposes of hop-growers in New York State. These poles are cut and drawn in by the neighboring farmers and deposited in large quantities for buyers. The latter reject all that are not straight or strong enough for their purpose, and when a sufficiency has been accumulated forward them to the various hop growers according to orders received from them. It is impossible to give the details of this trade, as in the Customs returns hop poles are bracketed with telegraph and hoop poles.

FOREST ENEMIES.

INSECTS AFFECTING FOREST TREES.

Mr. W. Saunders, of London, Ontario, the well-known entomologist, states that forest trees in every locality, in common with all other vegetable growths, are more or less liable to the depredations of insects. Insignificant frequently in size, they make up in numbers what they lack in individual power. Some attack the roots, feeding upon or boring into them, and thus sap the foundations of the tree's existence, others burrow under the bark, eating out channels or galleries through the sap wood, materially interfering with the flow of sap, or girdling the tree and so causing its death. Others, diminutive in size, attack the smoother bark of the twigs and branches, and puncturing their surface, suck the sap, the life of the tree; others burrow into the terminal shoots and cause their death, while a large army of others feed openly on the leaves, consuming their substance, and materially retard the growth of the trees they attack.

FOREST FIRES.

Fires raging season after season through the forest have caused a greater and more irreparable destruction than all the devastation caused by the combined lumber industries. Many of these fires are caused by careless ness, neglect, or utter indifference. Fire is in every country the greatest enemy of the forest, especially the pine forest, on account of its resinous and inflammable nature. Once fairly started, man is powerless to extinguish it. It sweeps onward as long as it can find food to consume, leaping over rivers, and is only brought to bay when it reaches lakes or rocky barren ground where there is nothing to burn. The first effect of these fires is the total destruction of the pine seedlings, which together with the younger growth are not strong enough to resist the effect of the scorching to which they were exposed. Another effect leading pecuniarily to enormous losses is the arrest of the growth in the trees exposed to these conflagrations. Another most pernicious effect resulting from the recurring fires is the total destruction of every particle of organic matter in the surface soil reducing it to a state of arid, barren sand of absolute sterility.

CATTLE.

The injuries resulting to the forest from the inroads of live stock are scarcely less destructive to its preservation than that sustained by fire. The unrestricted pasturing of cattle tends slowly but surely to its final destruction. The direct injuries result from the browsing and eating of the tender plants in their youngest state, and of the young shoots; the tearing, breaking and trampling down of the small growth, tending to its mutilation and decay, or being killed outright; in short, to the impossibility of the propagation of the forest by its natural seedlings. In pine lands these injuries are less apparent, the young trees not being eaten by

stock, but the damage results from trampling. The indirect injury arises from the enormous draft on the resources of the forest to build fences for the protection of the crops from cattle at large. The enormous sacrifices of labour and timber required in fencing tilled lands are a drawback to the settler, and the remedy lies in fencing stock *in*, and not in having to fence them *out*. "In all growing cities," says the Secretary of the Iowa State Agricultural Society, "which are up to the spirit of the times, fences are abandoned, and in those where fences were erected in an age closely allied to the barbaric they are being torn down. The good citizen fences in his cow and horse and poultry, and there is left to the view neighbours dwelling in unity." The benefits that would arise from the adoption of a stock law or law to fence cattle in would soon be apparent in the forest regrowth, as well as in the economy of its effects on the agriculturist, and the saving of the large annual outlay of keeping fences in repair to keep cattle out.

WASTE IN CUTTING.

Waste is caused in making square timber, in cutting down undersized trees, and in stripping hemlock bark indiscriminately. In making square pine the waste is estimated at one-fourth of the whole, and of that part which in saw logs gives the deals for which Canada is famous. As it is not every tree that is sound enough for square timber, many pines are left to rot after they are cut down, and there may be something wrong about the heart or in the length, which, whilst it might have turned out splendid saw logs, won't do for square timber. Square timber, on reaching England, is at once cut up to sizes required by the trade there, but if reduced here to those dimensions our lumbermen could dispose with profit of a quantity of sidings, cuttings, ends and slabs that are now totally lost. In Norway all the timber is shipped in all sizes of manufacture ready for use.

Felling undersized trees is killing the goose that lays the golden eggs, for on the growing timber depends the future of our forests. In the Dominion Lands Act, 35 Vic., cap. 23, sec. 51, one condition of the permission to cut timber on the public lands is the obligation of the lessee to "prevent all unnecessary destruction of growing timber on the part of his men."

The indiscriminate destruction of hemlock forests to supply bark for manufacturing extract for exportation, and leaving the timber thus stripped to decay, is a waste that will soon tell injuriously on the districts where it is carried on. It rests with the Provincial Governments in granting licenses to arrest this wholesale destruction.

HOW LUMBERING IS CARRIED ON.

Little is known of the labour expended on a common deal board before it finds its way into some article of domestic use. To illustrate the toil expended on this great staple, though lightly treated, article, the following sketch of lumbering and operations in the woods by the lumbermen

from whose hands it first comes may prove interesting. The latter are a race of men peculiar to Canada, Maine and the Far West, and it is in the depth of winter that their work in the woods is carried on, felling the huge pines which have been previously marked by persons sent out to explore the various timber limits leased by the mill owners from Government, preparatory to making them into square timber or saw logs. Five kinds of hands are necessary for the woods—the foreman, the hewer, the liner, the scorer, the road cutter and the cook. An ordinary shanty crew of two gangs of timber makers, sufficient to get out a raft of 80,000 feet of timber, would consist of a foreman, two hewers, two liners, four scorers, four road cutters, one cook and a teamster and crutchman. The provisions for a shanty are generally taken up in the previous spring, before sleighing breaks up, as the majority of the timber districts are inaccessible to waggons. The shanty is a rudely built log cabin, with bunks or sleeping places ranged round in tiers, with a huge raised hearth in the centre that throws out an immense heat from the logs that roar and crackle on it, and whose smoke escapes through an opening in the roof a little smaller than the hearth below.

Before commencing to make the square timber, the men are divided by the foreman into separate groups, each gang consisting of one hewer, one liner and two scorers; the road cutters, who have to clear a way to the stream or river and cut out the underbrush, are independent of the timber makers, and their number depends on the description of the country worked, as they have to clear roads to the timber made. The duty of the foreman is to search for the locality of the timber, and to point it out to the liners; to select the main road to the river by the shortest and most level route; to locate the site for the shanty in the fall; to see that each man is daily at his work, that the necessary amount of timber is made, and that it is sound and wholesome to suit the market. A return of the quantity cut is given in by the liner every week to the foreman. The teamster and crutchman next come into use, the latter so called from the description of sleigh he uses, which is merely the crutch of a birch tree fashioned into a sleigh. The stick of timber is chained on this, and drawn by the team to the rollway, which consists of a large space sixty or more feet square, cleared free from trees and brush. In this is laid a large tree which has been felled, and the bark taken off the upper side, to allow the timber to slide over it easily, on which from twenty to thirty sticks of timber are drawn and laid across so as to remain nicely balanced, with the end of the stick some few feet up. This is for the purpose of allowing the teamsters to drive up to the rollway, back their sleighs under, and by the slightest touch the stick is brought down on the sleigh and chained, and away goes the teamster with his load to the river without any trouble in loading. In the middle of December preparations are made for the reception of the teams, consisting of the building of stables and granaries. Teams are hired at so much per day for self (teamster) and horses, free of all expenses—that is, food for the driver and grain for the horses; price varying from $1.00 to $2.00, like

all other commodities, governed by supply and demand. These teams are loaded with provisions and their necessary supplies for the use of the trade at the depot and are started generally at the beginning of January to their destination. Arrived there, their packs thrown off, their teams are attached for hauling logs or hauling and fixing on a "bunk" that is a piece of timber two inches square and three feet long to the middle beam of the camp to allow the end of the skids of the next to rest on it, one foot on the end, the other treading on the end and raised in this way. As a certain number of beams are required to a building that depends on the number that the building is to contain. The skids being dry a mile or two of the river which others, which may be many miles and a day's time. In Ireland if a plank can be had, they are called "scantlings" and is not to be the habit of the farmers of the principal timber. Where, as in the New World, it is of many feet of timber are required. When the requisite materials are free from splinters and knots in the middle of a new beginning of timber are set aside in the woods, or left lying where it fell in the hauling season. In New Zealand, the [illegible] are a number of feet and, if by accident the end should be split, the log may be raised and to that another is placed on the other of two [illegible] are set [illegible] and [illegible] of the [illegible] and [illegible] a "jam." The [illegible] which cause this must be [illegible]. But the [illegible] most experienced [illegible] the [illegible] of a log, the most dangerous [illegible] all their [illegible] which [illegible] passage is half [illegible] the [illegible] of the [illegible] like straws, and [illegible] rush and [illegible] the [illegible] the [illegible] the [illegible]. The [illegible] and [illegible] [illegible] [illegible]

In driving timber through a lake where a good current exists in the middle of the stream, the timber that may have worked or been blown into the numerous bays with which they generally abound is towed out to the current by the boats' crews and allowed to drift down; but where the current is too sluggish kedging is adopted to cross the lake and reach the swift water. Where slides for single pieces of timber exist, the timber is retained at the head of the slide by a boom placed for that purpose, so that, when all the timber has arrived in it, they open the gap and commence feeding through the slide, piece by piece, as fast as the nature of the slide will admit of.

CONCLUSION.

In closing this sketch of the forests, and forest products of Canada, it may be well to state that the information it contains has been obtained from official sources, and consequently, may be considered reliable. Through the kindness of Professor Macoun, Dr. Dawson, and Professor Bell, of the Geological Survey, their reports have been placed at the disposal of the writer, and the various Provincial Governments responded to the utmost of their ability in giving such information on the subject as was at their disposal. The Trade and Navigation Returns, and the last Census Reports, have been used for statistics, and nothing in the whole work has been inserted without a reliable authority as its basis. Forestry is now attracting the attention which should have been given to it years ago, and the forthcoming Forestry Exhibition in Edinburgh will materially tend to increase the interest which so large and varied a branch of commerce evokes. Canada's forest wealth has been one of the great instruments in her progress, and it is with the object of more fully drawing public attention to this source of wealth, that the foregoing pages have been written.

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